News of the Industry Begins Page 887

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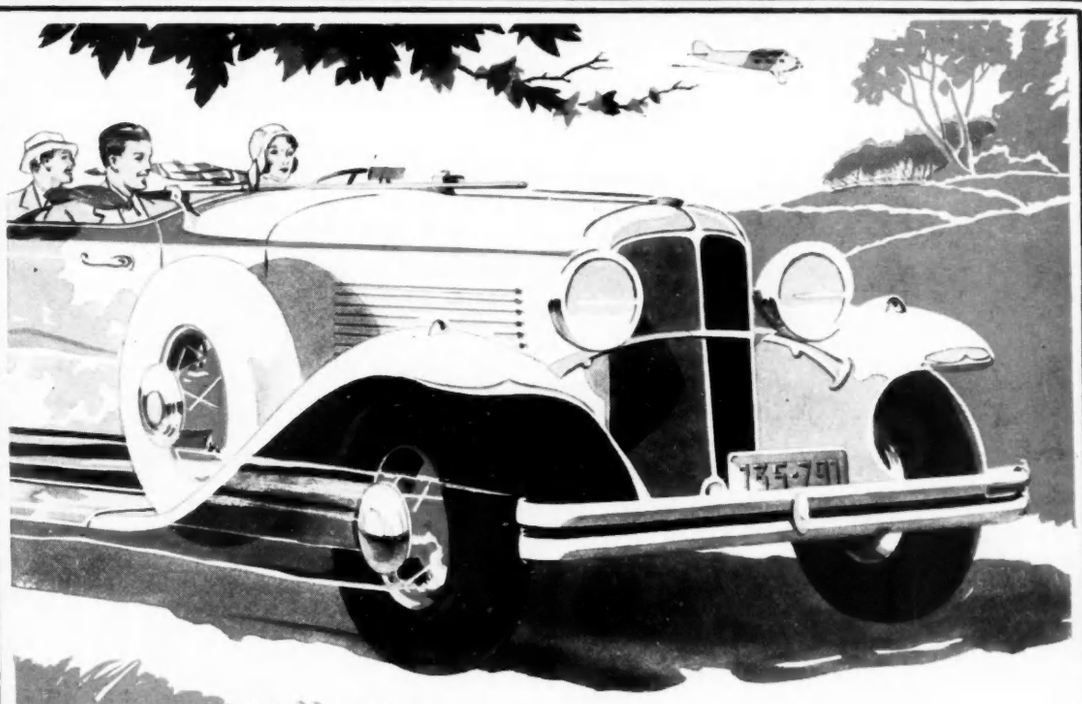

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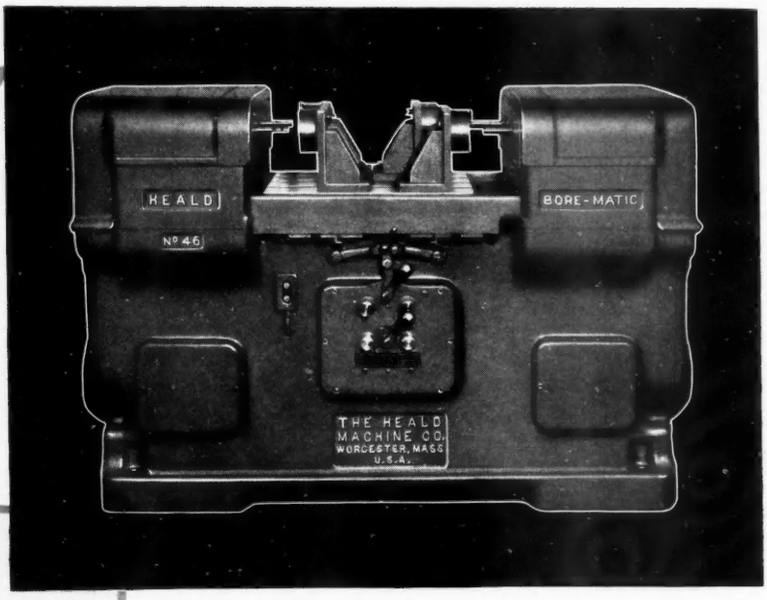

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HEALD

AUTOMOTIVE INDUSTRIES

VOLUME 64 JUNE 6, 1931 NUMBER 23

Confusion Added to Truck Design By New Laws on Weights and Sizes

by
A.
Burdet
Crofoot

NEW laws affecting the sizes and weights of commercial vehicles permitted to operate over the public highways of the various states, enacted during the 1931 legislative sessions of these various states, reflect a marked tendency on the part of many of the legislators to consider other than gross weights when establishing their limits.

The concentrations of the impact at the points of contact, namely, the wheels, have received far more consideration in the new laws, generally speaking, than ever before. This is evidenced by a more careful specification as to the number of wheels, the number of tires, the kind of tires, and the spacing of wheels and axles than was evident in the laws which they supersede.

While not all of the 44 legislatures meeting this year have adjourned as yet, enough have finished to permit the Motor Vehicle Conference Committee to tabulate partial results and gain some clear conception of what has been in the minds of the legislators. This tabulation has in turn been arranged in the accompanying table with the corresponding requirements of the old laws so that an easy comparison can be gained, and the trend in new legislation shown.

It will be noted that much more attention has been paid to axle loads, wheel loads, axle spacing, number of tires, tire widths and kind of tires than in the old laws. All of these factors, it is apparent, bear more directly upon the concentration of the load impact on the highway than does a mere limiting of the gross weight per vehicle regardless of how this load is distributed in its road contact.

Not enough attention has been paid, in the opinion of the Conference Committee, to the difference in weights permissible for pneumatic tires as compared with solid tires. Seven of the 15 states whose new laws have already been tabulated, do make some sort

Next Week—

June 14—The S.A.E. meets at White Sulphur Springs to discuss what's new in engineering.

June 13—Automotive Industries will meet these engineers with a galaxy of provocative articles on Automatic Clutches, Radiator Design, Free Wheeling, Body Design of the Future, Hypoid Gear Design, Rear Axle Lubrication.

of a differentiation in this respect, but in only two of these cases is this a new feature of the law. Oregon, on the other hand, had a provision in its old law which has been dropped in the new one. Kansas does state that after July 1, all vehicles must have pneumatic tires. As a factor in road wear, pneumatic tires almost automatically act as a safety valve on the load which can be carried. In addition to their cushioning qualities, they, by their very structure, set a maximum limit to what can be carried on them.

The matter of tire sizes also received considerable attention in many of the laws enacted this year. This was taken care of by specifying the weight allowed per inch of tire width. In two instances further limitations were placed in this regard by setting different per-inch weights for different widths. Thus Oregon allows 500 lb. per in. when the total tire width of the vehicle is 30 in. or less, but permits 600 lb. per in. when the total tire width is more than 30 in. Utah, too, allows 800 lb. per in. on tires more than 5 in. wide, 600 lb. on tires from 3 to 5 in. wide, and 400 lb. on tires less than 3 in. wide.

In the matter of distribution of loads a number of states have taken serious consideration of wheelbases or axle spacing. Three states have mentioned specific wheelbases in their new laws; New York allowing weights up to 36,000 lb. on any two consecutive axles spaced less than 14 ft. apart, Montana cutting in half the normal weights if the wheelbase is less than 8 ft., and Utah providing loads up to 34,000 lb. on vehicles with two or more axles or 18,000 per axle providing the distance between first and second axle is not less than 10 ft. and that between second and third is not less than 40 in.

A number of the states have set up limits based on the space between axles following a formula of W equals 600 (L plus 40) where W is the weight in pounds, and L the distance between axles expressed in feet. While the theory behind this provision is the same as that used by the National Conference on Street and Highway Safety, it is significant that the factor 600 is less than the minimum set by that body for the weakest units in practically any highway system, namely, the weakest bridge on secondary roads. This body used the formula in suggesting safe loads for bridges but gave the factor for the weakest bridges as 670, that for intermediate bridges as 1000 and that for the best bridges as 1330. This code is followed by West Virginia for bridges in that state. New York uses the formula with 750 for the factor for all highways.

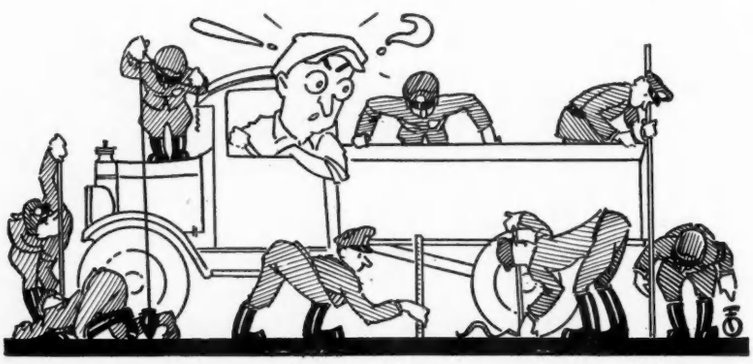
Where this formula is used not subject to other limiting figures, such as maximum vehicle weight, maximum axle weight or other conditions, it would appear to set a premium on long wheelbases, or wide separation of axles in vehicles of more than four wheels. In most cases, however, the formula applies from the center of the front axle to the center of the last axle, so that with the imposition of intermediary axles, the load could still be made to come within regulations for maximum axle weight. All of the states using this formula so far, also have limiting overall length regulations. Were it not for these limiting factors, demands might arise for vehicles which had exceptionally long wheelbases, markedly increasing the problems of the manufacturer and the driver, as well as creating a decided nuisance for other users of the road.

In the matter of axle spacing, many of the states have put in a stipulation that, in order to be counted as separate axles, any two must be at least 40 in. apart. This, coupled with the maximum allowable axle weight specified in most of these cases, again takes into consideration the concentration of the weight in its road impact. Nevada has set a limit in this particular of 42 in. and New York goes still higher and sets the limit at 46 in.

In many of these cases the state legislatures have indicated their unwillingness to be guided by national bodies. Those states, for example, which failed to differentiate between pneumatic and solid tires in setting weight limits, have ignored the advice given them by the National Conference already referred to and the Bureau of Public Roads. The same is true of those which used the formula mentioned above using 600 as a factor instead of some factor that would be more nearly commensurate with average highway conditions. The 40-in. minimum for spacing of axles to be counted separately is a recommendation of the Bureau of Public Roads, but only seven of the states reviewed fell into line in this respect. The new West Virginia law, however, does follow the National Conference code almost to the letter.

One outstanding example of what the Conference Committee regards as impractical legislation is shown in the case of Alabama. This state sets an axle load of 12,000 lb., and then proceeds to state that the axle load shall be taken as the gross weight divided by the

(Turn to page 896, please)



New and Old Truck Restrictions

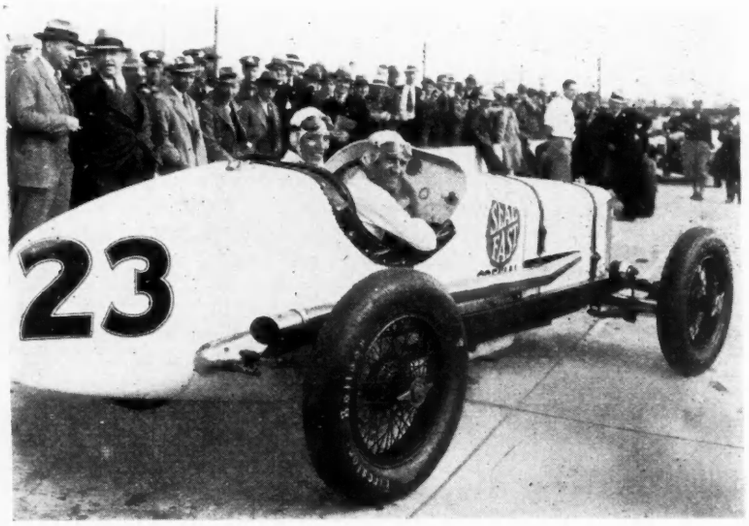
Bold face denotes recent weight and size requirements. Light face type shows previous laws

STATE	LENGTH (Feet)	4-WHEEL GROSS (Pounds)	6-WHEEL GROSS (Pounds)	COMBINATION GROSS (Pounds)	MAXIMUM GROSS (Pounds)	AXLE LOAD (Pounds)	WHEEL LOAD (Pounds)	TRACTORS (Pounds)	PER INCH TIRE WIDTH (Pounds)	SOLID TIRES (from gross)	METAL TIRES (from gross)	W-a (L plus 40)*	MINIMUM AXLE SPACE (Inches)
ALABAMA	33 single 85 combine **33 single** **46 combine**				22,000 **32,000**								
DELAWARE	33 single 60 combine **no mention**	24,000 **26,000**	36,000 **36,000**	38,000 **40,000**		16,000 **18,000**		10,000 **10,000**	700 **700**	2,000 lbs. **2,000 lbs.**	4,000 lbs. **4,000 lbs.**		
GEORGIA	30 single 85 combine **35 single** **45 combine**	22,000 **12,500 load per unit**				17,600 **6,350 load per unit**			800				
INDIANA	 **33 single** **40 combine**	28,000				22,400 **16,000**	 **8,000**		800 **800**	4,000 **20%**		**a equals 600**	**40**
KANSAS	33 single 60 combine **35 single** **50 combine**	24,000 **24,000** **28,000 on duals**	34,000 **34,000** **38,000 on duals**			16,000 **16,000** **18,500 on duals**			700				
MAINE	 	18,000 20,000 **18,000** **24,000**	24,000 **24,000**			13,500 16,000 **13,500** **16,000**			700 **700**	 **4,000 from maximum**			
MASS	28–33 thru rds. **28–33 single** **40 combine**		40,000 thru rds. **40,000**	40,000 **40,000**	30,000 **30,000**				800	2,000 **2,000 for single unit**			
MONTANA	no mention **33 single** **40 combine**	no law **24,000**			**34,000**	**16,800** **13,000 on more than 4 wheels** **8,400 if less than 8 ft. w. b.**			**800**				
NEVADA	 	25,000 **25,000**	38,000 **38,000**			 **18,000 on 6-wheel bus**			600 **600**				42 **42**
NEW MEX	35 single 85 combine **no mention**	22,000			26,500/unit 40,000/1st 2 units 22,000/each succeeding 16 feet	18,000 11,000 if more than 4 wheels **18,000**			800 rubber 500 metal **800 rubber** **500 metal**			**a equals 600**	**40**
NEW YORK	no mention **33 single** **85 combine**	28,000 **36,000**	42,000 pneu. 36,000 solid **30,000 plus 650L* up to 44,000** **50,000 on 8 wheels**	42,000 use 2 wheel trailer		 **22,400** **36,000 on consecutive axles less than 14 feet apart**	11,200 4-wheel 9,000 6-wheel **11,200**		700 **800**	36,000 on 6-wheeler **20%**	 **40%**	**a equals 750**	**46**
NO. DAK	33 single 85 combine **35 single** **no more than 1 trailer**				Option highway authorities **20,000**				 **600**				
OREGON	Set by Highway Commissioner **34 single** **65 combine** **50 combine after Jan. 1, 1933**	22,000	34,000 min. axle space 8' 27,000 if less than 8'		 **49,000**	16,000 10,500 if axles of 6-wheeler less 8 feet apart 3,500 on metal tires **16,000** **17,000 on paved rds.**	 **8,000** **8,500 on paved rds.**		500 if less 30" 600 if more 30" **500 if less 30"** **600 if more 30"**	18,000 **load limit**	7,000 **load limit**	**a equals 600**	**40**
UTAH	no mention **33 single** **85 combine**	 **22,000**	 **34,000 if w. b. not less 10'**		22,000 20,000 outside cities 	 **18,000 if w.b. not less than 10 feet**	7,500		 **400** **800 by width**	 **25%**			**40**
W. VA	40 single 60 combine **33 single** **85 combine**				20,000	17,000 **16,000** **22,400†**	9,000 **8,000** **11,200†**	22,000 with trailers	600	 **none in major metropolitan** **20% other major** **50% secondary**		**a equals 670** **1330 for bridges**	**40**

* L equals distance in feet between axles. W equals weight. a equals factor. † Permissible weights vary according to areas and types of roads.

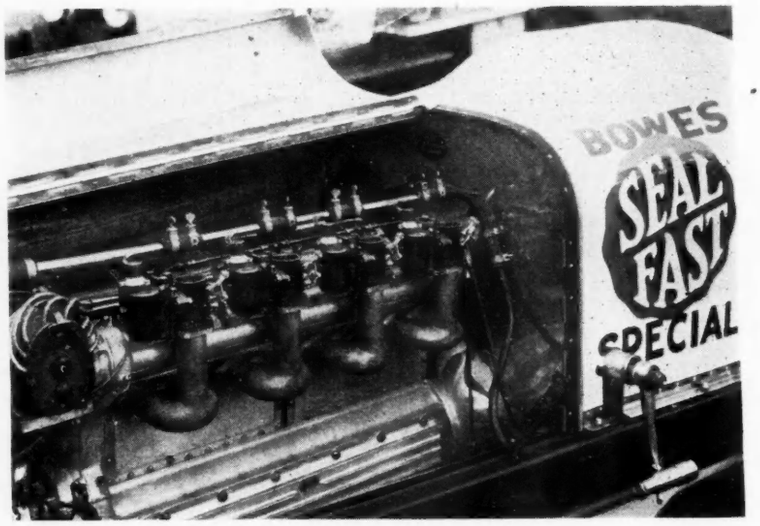
Modified Stock Engines Finish Near At Indianapolis Speedway

by W. K. Toboldt



Dave Evans, driving a Cummins - Diesel Special, was the first in the history of the race to go the entire distance without a stop

Above—The average of 96.629 m.p.h. made by the winner, Louis Schneider, would have been much higher only the speed was reduced to about 70 m.p.h. for nearly 100 miles because of rain and accidents + + +



Right—The engine that carried Schneider to victory was a 150-cu. in. Miller, fitted with four Winfield carburetors and a Bosch magneto +

THE record made by the Cummins-Diesel in traveling the entire 500 miles without a single stop and the exceptionally fine performance of the near stock passenger car engined jobs were undoubtedly the outstanding features of the nineteenth annual Indianapolis race.

In the past, cars have made at least one stop for gas, water, oil and tires at approximately the halfway mark and the Diesel, while not making any speed record, has the distinction of being the first car to go the full distance without a stop. Its average of 86.170 m.p.h. brought it in thirteenth and while its position would not have been improved, the average speed would have been several miles per hour faster, if the entire field had not been slowed down to a speed of about 70 m.p.h. for nearly 100 miles.

The reduced speed was caused first by rain and later by a series of accidents, otherwise the 101.13 m.p.h. record of Pete De Paolo would undoubtedly be a thing of the past. As it was, Louis Schneider in his 150 cu. in. Miller engined Bowes Seal Fast Special averaged 96.629 m.p.h. to win first place, and prior to his accident Billy Arnold was averaging approximately 107 m.p.h. per lap.

Probably as a result of the revision in rules permitting the use of one carburetor for each pair of cylinders, the best qualifying speed this year was nearly 3 m.p.h. faster than last year. And all cars except two, the Butcher Bros. Special and the Diesel, qualified at more than 100 m.p.h.

While Ralph De Palma's car did not qualify, its Wehr rotary valve engine is of considerable interest. The valve shaft was mounted in wedge-type bearings, with

Leaders in Nineteenth Annual Race

The car driven by Fred Frame was powered with a Duesenberg race engine and finished in second place, less than a minute behind Schneider + + + + +

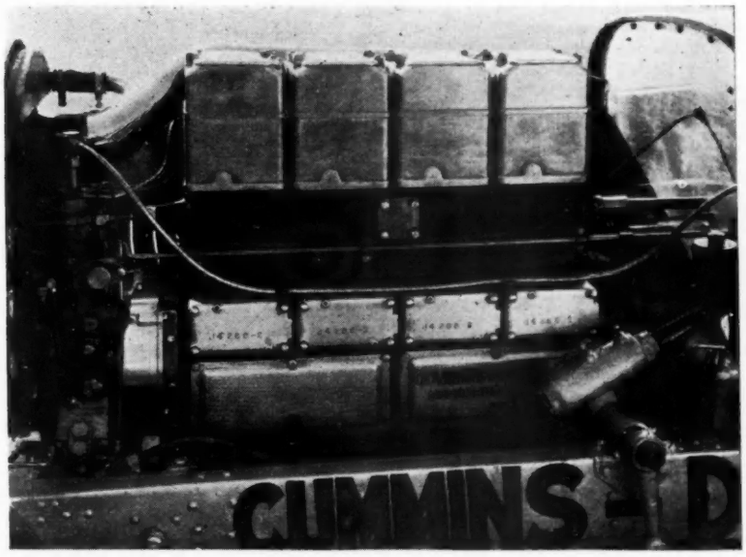
the clearance controlled by oil pressure, a Skinner rectifier being used to draw off the surplus oil. In practice the car attained a speed of about 100 m.p.h.

But to return to the cars that may be classed as near stock. Altogether there were twelve cars, their qualifying speeds ranging from 99.343 m.p.h. for the Butcher Bros. Special to 112.796 m.p.h. (the third highest qualifying speed), made by the Russell Eight with a Studebaker engine. These cars are becoming a real threat to the especially built race car engines. Incidentally these twelve cars do not include two Fords with special overhead valve cylinder heads and the Duesenberg model A engines with a shortened stroke.

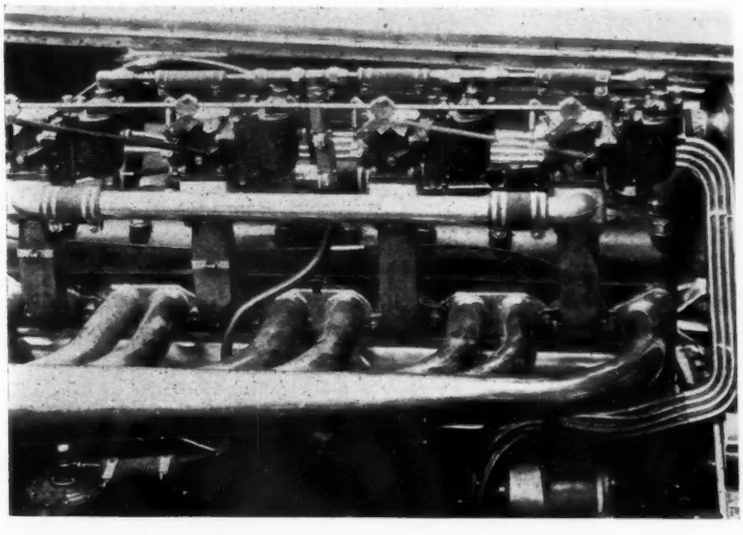
When speaking of these near stock cars it must be remembered that they were entered and prepared by individuals, and not by the car factories.

Cars with modified stock engines finished fifth, ninth, tenth, eleventh and twelfth, and the record would have been better if the Richards Special and the Hunt Special had not been forced out because of accidents. The former was unable to avoid Arnold's car when the latter broke his rear axle and the Hunt Special also went through the wall when it skidded on its 166th lap. Incidentally it was running in second position at the time and was about one lap behind Schneider, who was leading.

The Russell Eight, the Hunt Special and the Richards Special with modified



The Cummins-Diesel engine has four cylinders with a bore and stroke of 4⅜ in. and 6 in., weight of the entire car being 3389 lb. + + + + +



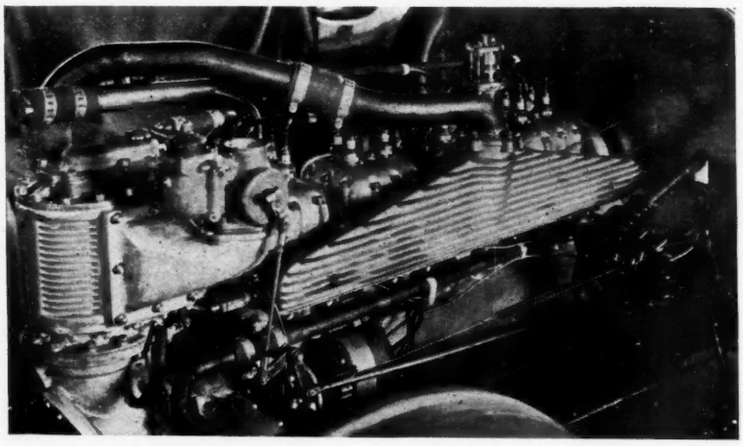
Left—The Hunt Special with a near stock Studebaker engine was running in second place when it went over the wall in its 166th lap. With the exception of the use of four Winfield carburetors, new exhaust manifolding, a Bosch magneto and a shorter wheelbase, this car was essentially stock + + +

Symposium of the Indianapolis Classic

Position	Driver	Car	Engine	No. Cylinder Bore & Stroke	Displacement cu. in.	Qualifying Speed M.P.H.	Speed for the 500 miles M.P.H.	No. of Pit Stops	No. of Laps Run	Cause of Withdrawal	Car Weight	No. and Make of Carburetor	Wheelbase inches	No. and Make of Valves	Piston Make
1	Louie Schneider	Bowes Seal Fast Sp.	Miller	8-2 5/8x3 1/2	151.7	107 210	96.629	1	500		1819	4-Winfield	103	16-Jadson	Butler
2	Fred Frame	HartzDuesenbergSp.	Duesenberg	8-2 3/4x3.156	150	109.273	96.406	1	500		1750	4-Winfield	100	16-Thompson	Ray Day
3	Ralph Hepburn	Harry Miller Spe.	Miller	8-3 1/8x3 3/4	230	107.933	94.224	2	500		1950	4-Miller Adamson	105	16-Miller	Miller
4	M. Stevens	Jadson Special	Miller	8-3 1/8x3 3/4	230	107.463	94.138	2	500		1800	4-Winfield	100	16-Jadson	Emsco
5	Russell Snowberger	Russell Eight	Studebaker	8-3 1/2x4 3/8	326	112.796	94.090	1	500		2520	4-Winfield	102	16-Thompson	Ray Day
6	Jimmy Gleason	Duesenberg	Duesenberg A.	8-2 7/8x4 5/8	243	111.400	94.026	5	500		2056	4-Winfield	103	16-Thompson	Ray Day
7	Ernie Triplett	Buckeye Special	Duesenberg	8-2 3/4x3 11/12	150	111.039	93.041	1	500		1835	2-Winfield	100	16-Thompson	Ray Day
8	Stubblefield	Jones-Miller Spe.	Miller	4-3 3/4x4 1/2	183	108.797	92.424	2	500		2000	2-Winfield	104	8-Thompson	
9	Cliff Bergere	Elco Royale Spe.	Reo	8-3 3/4x5	357	106.781	91.839	1	500		3535	4-Winfield	130	16-Rich Tool	Alum. Co. of Am.
10	Chet. Miller	Marr Special	Hudson	8-2.889x4 1/2	235	106.185	89.580	3	500		2780	2-Winfield	106	16-Rich Tool	Alum. Co. of Am.
11	George Howie	G. N. H. Special	Passenger Car	8-3 3/4x5	356	102.884	87.651	3	500		2670	4-Winfield	104	16-Thompson	Ray Day
12	Phil Shafer	Shafer Eight	Passenger Car	8-3 1/16x4 5/8	273	105.103	86.391		500			4-Winfield	106	16-	Alloy
13	Dave Evans	Cummins Diesel	Cummins	4-4 5/8x6	360	96.871	86.170	0	500		3389		104		Ray Day
	RUNNING AT THE FINISH														
	Gene Haustein	Fronty Special	Ford-L. Chev.	4-3 11/16x4 1/2	219	108.395		4			1854	2-Winfield		16-	L. Chevrolet
	Billy Winn	Hoosier Peter Spe.	Clemons	8-3 1/2x3 1/2	223	105.405		6			2248	2-Winfield	104	16-Thompson	Bunite
	Sam Ross	Miller Special	Miller	4-3 1/2x4 1/2	160	104.642		3				2-Winfield	103	8-Thompson	Miller
	*Joe Huff	Goldberg Bros. Spe.	Cooper	8-2 3/8x3	100	102.386		5			1750	4-Winfield	99 1/2	16-Jadson	Bunite
	Al Aspen	Alberti Spe.	Duesenberg A.	8-2 7/8x5	260	102.509		3			2300	4-Winfield	104	16KingQuality	Ray Day
	CARS ELIMINATED THROUGH ACCIDENT OR FAILURE														
	*Billy Arnold	Miller-Hartz Spe.	Miller	8-2.625x3.5	151	116.080		1	161	Rear Axle	1757	4-Winfield	102	16-Jadson	Ray Day
	Shorty Cantlon	Miller Special	Miller	16-2 5/8x3 1/2	302	110.372		3	86	Connecting rod failure	2320	8-Miller Adamson	105	32-Miller	Miller
	*Bill Cummings	Empire State Spe.	Miller	8-2 11/16x4	215	112.563		0	69	Broken oil line	1820	4-Winfield	103	16-	Ray Day
	Deacon Litz	Maley Special	Duesenberg	8-2 3/4x3 3/32	150	111.531		3	176	Broken tie rod	1820	4-Winfield	102	16-	Ray Day
	Louie Meyer	Sampson Special	Sampson	16-2 5/8x3	200	113.522		2	27	Oil leak	2093	8-Winfield	103	16-Jadson	Jadson
	Herman Schurch	Hoosier Pete Spe.	Clemons	8-3 3/16x3 1/2	223	102.845		1	4	Transmission	2250	2 Winfield	104	16-Thompson	Bunite
	Lou Moore	Boyle Valve Spe.	Miller	8-3 1/16x3 3/4	230	103.725		5	104	Differential locked.	1940	4-Miller Adamson	105	16-Boyle	Emsco
	*Frank Brisko	Brisko-Atkinson Sp.	Miller	8-2 5/8x3 1/2	151	106.286		2	126	Broken steering arm	1850	4 Winfield	104	16-Boyle	Ray Day
	*Speed Gardner	Nutmeg State Sp.	Miller	8-2 5/8x3 1/2	151	109.820		3	96	Broken frame	1767	2-Winfield	100	16-Jadson	Jadson
	Fred Winnai	Bowes Seal Fast Spe.	Miller	8-2.35x3 1/2	122	105.889		0	59	Accident	1762	4-Winfield	100	16-Jadson	Butler
	Pauel Bost	Empire State Spe.	Miller	8-2 11/16x4	222	112.105		0	34	Broken rod	1980	4-Winfield	103	16-	Ray Day
	Phil Pardee	Duesenberg Spe.	Duesenberg A.	8-2 7/8x4 5/8	243	107.772		2	58	Accident	2125	4-Winfield	103	16-Thompson	Ray Day
	Frank Farmer	Jones Miller Spe.	Miller	4-3 3/4x4 1/2	183	108.303		0	31	Rod bearing	2000	2-Winfield	104	8-Thompson	Jadson
	Tony Gulotta	Hunt Special	Studebaker	8-3 1/2x4 3/8	322	111.725		1	166	Accident	2572	4-Winfield	110	16-	Bohnalite
	Babe Stapp	R & H Special	Duesenberg A.	8-2.9x5	264	110.125		1	13	Clutch	2248	4-Winfield	103	16-Thompson	Ray Day
	Joe Russo	Russo Special	Duesenberg A.	8-2 7/8x5	260	104.822		9	108	Lubrication	2450	2-Winfield	103	16-Thompson	Ray Day
	John Boling	Grapho Special	Morton&Brett	8-3x4	226	102.860		1	6	Rod bearing	2235	1-Winfield	105	16-Boyle	M & B
	H. Butcher	Butcher Bros. Spe.	Passenger Car	8-3 1/16x4 5/8	272	99.334		0	5	Accident	2590	4-Winfield	106	16-	Ray Day
	Leon Duray	Leon Duray Spe.	Duray 2 Cycle	16-2 7/16x3 1/4	243	103.131		0	5	Overheating	2000	1-Winfield	103	2-Cycle	Duray
	Luther Johnson	Richards Special	Studebaker	8-3 1/2x4 3/8	322	107.652		1	155	Accident	2600	4-Winfield	102 1/2	16-	Bohnalite
	Weingerter	Weingerter Spe.	Duesenberg A.	8-2 7/8x5	260	100.139		0	28	Broken tank	1950	4-Winfield	105	16-Thompson	
	Francis Quinn	Tucker Tappet Ford	Miller-Schofield-Ford	4-4x4 1/4	213	111.321		0	2	Rear axle	1903	2-Winfield	102	16-	Emsco

* Front drive.

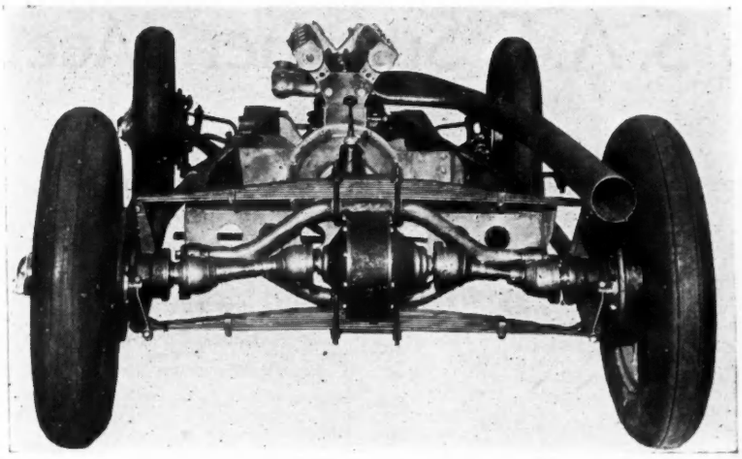
Duray had overheating trouble with his two-cycle, 16-cylinder car and lasted only five laps. Note the positive displacement supercharger at the front end. Cylinder blocks are of aluminum with steel sleeves and the connecting rods are attached to the single crankshaft through links + + + + + + + + + +



Studebaker engines mounted in relatively short wheelbase chassis were each fitted with four Winfield downdraft carburetors and Bosch magnetos. Compression ratios were approximately 7 to 1. No mechanical trouble was experienced, the cars making only one pit stop to replenish the fuel supply.

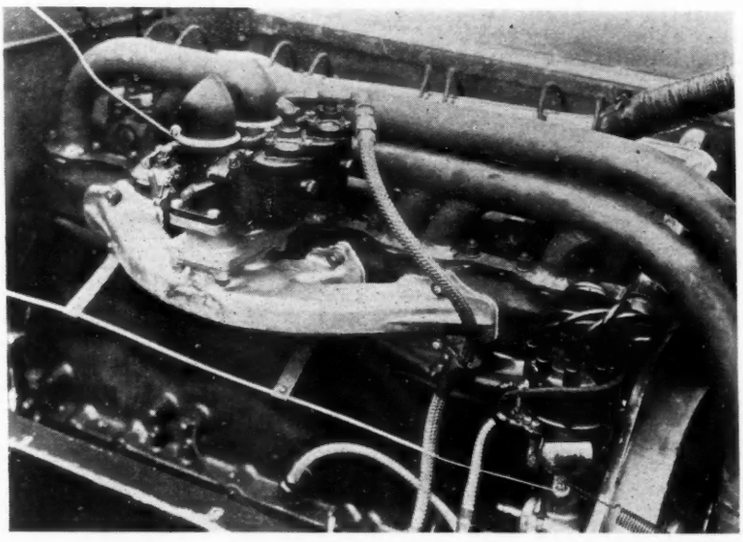
The Elco Royale with a Reo engine used a stock chassis of 130 in. wheelbase and the stock Delco-Remy ignition. Four Winfield downdraft carburetors were used and its average speed of 91.839 m.p.h. brought it in ninth position. A single stop was made for gasoline and a tire, the latter being a precautionary measure only.

Racing dope was considerably upset by the Marr Special, a Hudson engined car that finished in tenth place. This is the first time in many years that a splash lubricated engine has finished in the money. Only two Winfield car-



Above—The Hoosier Pete cars, designed by F. E. Clemons, Indianapolis, had independent wheel suspension at the rear. Driving reactions were taken by heavy radius rods extending along the sides of the chassis + + + + + + + +

Below—Cantlon, Hepburn and Lou Moore drove new Miller cars with independent wheel suspension at the rear. These cars rode and handled well and will undoubtedly be a real threat next year + +



Left—The Marr Special with a modified Hudson engine was the only one in the race to use splash lubrication. With the exception of the carburetors and manifolding, this engine was said to be of stock parts, and finished in tenth place

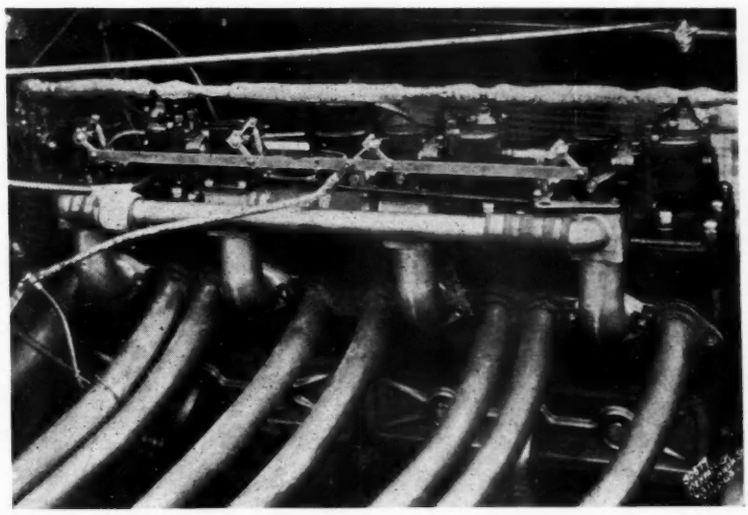
Below—The Elco Royale Special was powered with a 3⅜ x 5-in. Reo engine and finished in ninth position. As was the case in the other near stock cars, the carburetion and manifolding were changed

buretors were used on this car and a standard Auto-Lite unit furnished ignition.

Practically all of the units used on the G. N. H. Special came from an assembly line in Detroit. This 356 cu. in. engine was fitted with a Mallory ignition system and four Winfield carburetors.

The Shafer Eight and the Butcher Bros. Special also used passenger car engines, with push rod operated overhead valves, the former finishing in twelfth position and the latter was forced out because of an accident.

Only three of the twelve near stock entries were forced out because of mechanical trouble. But even this cannot be considered as a reflection on stock parts as the troubles were minor. The R & H special had clutch trouble, Russo had lubrication trouble and a leaking gasoline tank accounted for the withdrawal of the Weingerter car.



Complete details of the cars and the race are given in the illustrations and the accompanying table.

All Roads Lead to S. A. E. Summer Meet

SUNDAY, JUNE 14

TRUCKS and COACHES SESSION

8.30 p.m. Auditorium
H. W. Alden, Chairman

Rating the Truck
M. L. Pulcher, Federal Motor Truck Co.

A Suggested Basis for Rating Trucks
L. R. Buckindale, Timken-Detroit Axle Co.

MONDAY, JUNE 15

FUELS SESSION

10.00 a.m. Auditorium
A. L. Beall, Chairman

Further Developments in Determining Gum in Gasoline
O. C. Bridgeman and E. W. Aldrich

Fuel Line Temperatures in 1931 Cars
O. C. Bridgeman and H. W. White

The Interpolation Method in Detonation Testing
D. B. Brooks

Carburetor Design for the Fuel Research Detonation Engine
C. S. Kegerreis, Toledo

TRANSPORTATION SESSION

10.00 a.m. Ball Room
F. K. Glynn, Chairman

Utilization of Motorcoaches
D. A. Smith, Dept. Street Rwys., Detroit

DIESEL ENGINE SESSION

8.30 p.m. Auditorium
W. F. Joachim, Chairman

Automotive Diesel Fuels
W. H. Butler, Standard Oil Co. of N. J.

Practical Experience with Devices for Damping Torsional Vibrations
Erich Sandner, Dortmund, Germany, and J. B. Frauenfelder, Philadelphia

WATER CARNIVAL

10.30 p.m. The Pool

TUESDAY, JUNE 16

PASSENGER CAR BODY SESSION

10.00 a.m. Auditorium
L. C. Hill, Chairman

Comfort and Interior Appointments
H. A. Brunn

What Body Engineer Wants in a Chassis
R. F. Anderson, Murray Corp. of America

Instrumentation as a Means for Coordinating Chassis and Body Design
Athel F. Denham, Automotive Industries

PASSENGER CAR SESSION

8.30 p.m. Auditorium
W. C. Keys, Chairman

The Tear-Drop Car
W. T. Fishleigh, Detroit

Driving High-Speed Cars—J. E. Hale

WEDNESDAY, JUNE 17

FUTURE DEVELOPMENT SESSION

10.00 a.m. Auditorium
W. J. Davidson, Chairman

The Field for Synthetic Lubricating Oils
F. W. Sullivan, Jr., V. Voorhees, P. T. Oak and D. P. Barnard

The Case in Favor of Cars With Rear Engine Mountings
Herbert Chase, American Machinist

STANDARD SESSION

10.00 a.m. Ball Room
Arthur Boor, Chairman

Reports of the various Divisions

FIELD DAY

2.00 p.m.

SEMI-ANNUAL BUSINESS MEETING

8.30 p.m. Auditorium
President Vincent Bendix in the Chair

AIRCRAFT

Dr. G. W. Lewis, Chairman

Flying With the Navy—Hon. D. S. Ingalls, Asst. Sec. of Navy

THURSDAY, JUNE 18

AIRCRAFT ENGINE SESSION

10.00 a.m. Auditorium
Arthur Nutt, Chairman

Air-Cooled Cylinder Head Design
Roland Chilton, Wright Aero. Corp.

Recent Valve Developments
A. T. Colwell, Thompson Products, Inc.

CHASSIS SESSION

10.00 a.m. Ball Room
E. S. Marks, Chairman

The Tire Factor in Riding Quality
R. W. Brown, Firestone Tire & Rubber Co.

Road Tests With the New Wabblemeter
D. F. A. Moss, George Washington Univ.

Some Observations on Riding Qualities
Dr. Ammon Swope and Prof. H. M. Jacklin, Purdue University

AVIATION DEMONSTRATIONS

2.00 p.m.

GENERAL PRODUCTION SESSION

8.30 p.m. Auditorium
E. K. Wennerlund, Chairman

Cost to Industry of Labor Turnover
H. L. Horning, Waukesha Motor Co.

GRAND BALL

10.30 p.m. Ball Room

FRIDAY, JUNE 19

10.00 a.m. Auditorium

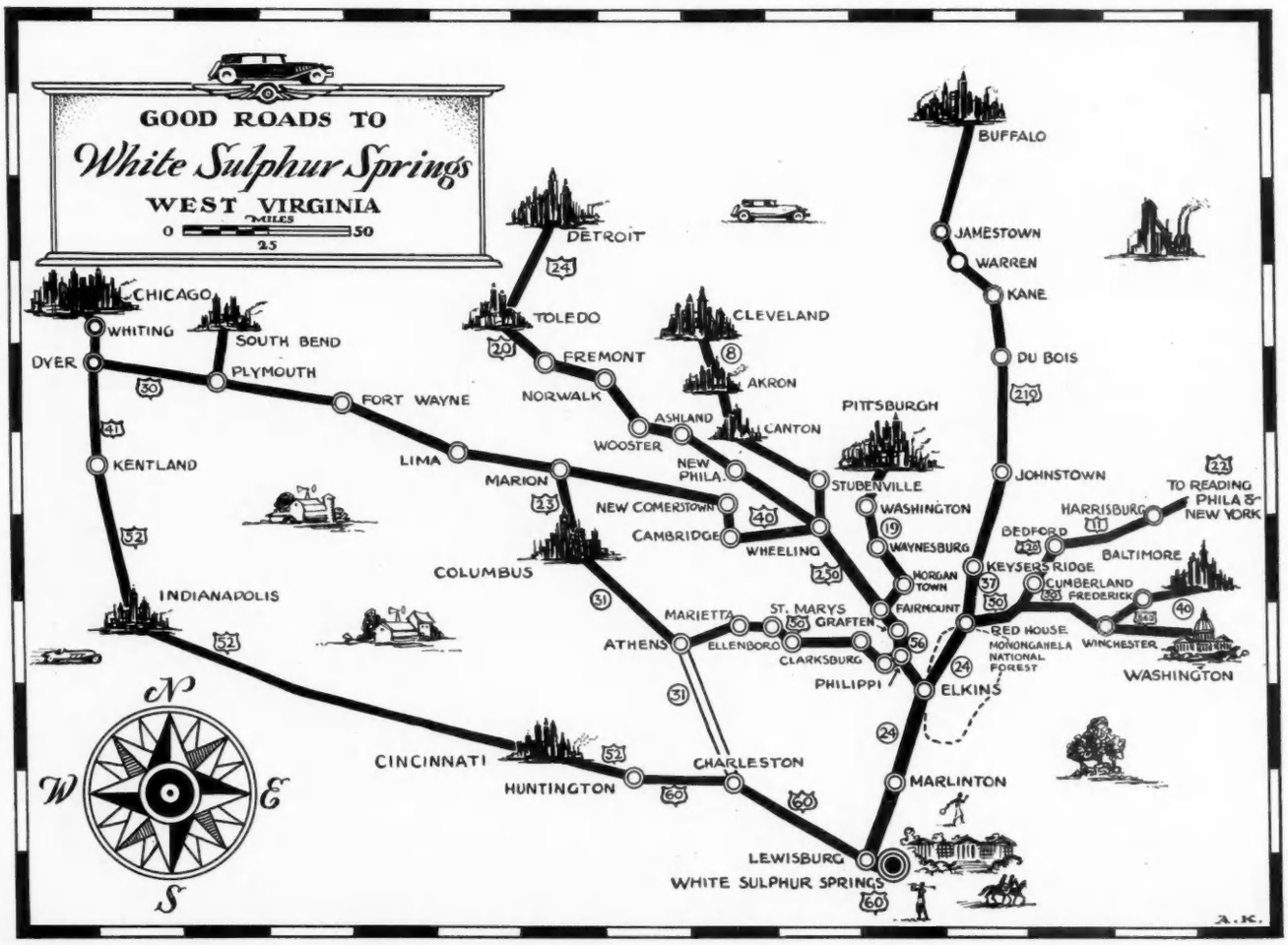
ENGINE SESSION

G. C. Brown, Chairman

Oil Control in the Engine
H. C. Mougey, General Motors Corp.

Winter Starting Tests
P. J. Kent, Chrysler Corp.

Reduction of Fan Noise and Fan Power
A. D. Gardner, Auto. Fan & Bear. Co.



JUST AMONG OURSELVES

Getting That Is Getting What?

THE scene; City Hall plaza in Detroit.

The time: 11 p.m. one night recently.

In three or four groups of 25 to 50 each workmen and passers-by of various kinds are gathered about several Socialist orators who had been holding forth since early in the evening. The speeches apparently had been finished; but the argument was lingering on.

The usual arguments were being tossed back and forth, the intelligence of the answers exceeding that of the questions for the most part. The stock objections to Socialism were raised by the argufiers and the stock affirmations concerning it were made.

Inevitably came the question from an irritated, hawknosed heckler: "Well, you say that we are all wage slaves; that we will be so long as we work for wages. What would we get if we had Socialism?"

Came the reply quick and ready from the little Jewish zealot who had been damning Mr. Ford and Mr. Sloan with charming equality: "Under Socialism you would receive the full product of your labor."

"Huh?"

"You would receive the full product of your labor. Every working man would."

"Yeah, but what would we actually get?"

"The full product of your labor, I tell you!"

"Yeah, but what the hell is that?" . . . .

And so on into the night. . . . .

From Under Two Coats

THERE were other interesting sidelights. There was the one Socialist speaker who might well have been taken for the beloved village preacher, so calm were his statements, so kindly his quiet smile and so friendly yet firm his manner. He was being heckled eagerly by a fresh, clean-cut, red-headed youngster of about 21 who was arguing that one should not worry about what he got here on earth; that what one gave up here one was sure to be rewarded for hereafter. The youngster was terribly sincere. The Socialist philosopher began asking questions, quietly, piercingly. It was an unequal combat as a debate, of course, and the youngster finally turned away in disgust.

And the Fringed Fringe Spoke

THEN there was the stooped old Irish woman who walked about the edge of the crowd, drawing the traditional shawl about her shoulders, and telling anyone who would stand still, listening or not, what a tough world it had gotten to be and who repeated over and over again: "It's about time they did something about it, when an honest person can't get work nowhow, nowhere."

And the sodden old bum, liquored into a nearly comatose condition who would listen querulously with eyes intent on the speakers for many minutes at a time, then finally burst out in a loud tone with a positive statement that sounded with all the sonorous finality of the doomsday trump. Careful listening failed to reveal just which side of the argument he was on; perhaps he did'nt know himself. But we're still curious.

Change Comes Not for Change's Sake

THE closer one gets to the actual dispersing of such economic propaganda as would try to upset our present system in this country, the more confidence one has in the stability of our system because of the terrific inertia of the human mind alone, leaving aside even the unsoundness of many of the change proposals being urged.

A large proportion of those who stayed about City Hall plaza that night after the speech-making was over—and the crowd which remained was almost as large as the crowd which listened—remained to oppose and not to learn; to argue and not to get information.

Converts are difficult to make for any cause and even more difficult to hold. Even disagreeing in toto with the theories propounded by the orators, one almost feels a bit sad at their utter and complete lack of ability to make any real dent on the minds of their hearers, because one is left with the feeling that influencing human behavior in any major sense is harder than moving mountains. We'd like to think that the soap-boxers whom we heard failed to move their audience because of the unsoundness of their theories—but honesty compels the thought that their failure was due as much to the heavy mental inertia of their hearers as to lack of lucidity of their expositions.—N.G.S.

A. S. M. E. Told Alloy Steels Improve Cutting Fluid Affects Torque

"Reliability of aeronautic engines is due in large measure to improvement in parts," said Com. E. E. Wilson at the Tuesday banquet at Hartford + + + + + +

by Joseph Geschelin

AIR-COOLED engines were credited with the successful development of the aeronautic industry by E. E. Wilson, president, Chance-Vought Corp., principal speaker at the Tuesday banquet of the American Society of Mechanical Engineers meeting held this week at Hartford, Conn.

Reliability of engines, due in large measure to improvements in parts such as spark plugs, magnetos and the introduction of inertia starters, were said to be factors of prime importance in the success of the aircraft industry.

The greatest present need of today is for land and sea craft designed to meet specific requirements, he pointed out, saying that the new Sikorsky seaplane, with large passenger capacity and with a cruising range capable of long hops, was an important development in this direction.

Problems of technologic unemployment, due to labor-saving machinery and devices, came in for a strenuous discussion, led by Roy V Wright, president of the A.S.M.E. It was reported that the American Engineering Council is now setting up a plan for studying this problem through a committee. Ralph E. Flanders, manager, Jones & Lamson, is the A.S.M.E. member of this committee.

Progress Report No. 3 of the subcommittee on cutting fluids, which was presented jointly by O. W. Boston and C. J. Oxford, under the title "Performance of Cutting Fluids," marked the development of an ambitious program undertaken by the A.S.M.E. special research committee on cutting metals. The basis for the entire project was the recognition for the necessity of studying cutting fluids and to replace, if possible, the rule-of-thumb methods with some definite, technical procedure. Progress Report No. 1 presented at the A.S.M.E. annual meeting in 1929 took up the fundamental aspects of the problem and discussed the nature of the variables. Progress report No. 2, presented at the A.S.M.E. annual meeting 1930, gave the results of a wide survey of practice in metal-working plants in many industries.

This year *Automotive Industries* undertook an independent investigation in the field of cutting fluids and their utilization, resulting in two articles. The first, published February 14, 1931, defined the variables involved in metal cutting, classified the cutting fluids generally used, and noted some of the accepted theories of what happens when metal is cut. This article also discussed the practical consideration involved in the utilization of cutting fluids and showed a suggested set-up for selecting and testing. The second article, published May 2, analyzed completely the results of a survey of cutting fluid practice in 36 large automotive plants.

The net result of previous investigations has been to emphasize the variables involved, the lack of uniformity in practice, and the general dependence upon rule-of-thumb methods. The object of the present work, therefore, is to study the characteristics of cutting fluids as determined by their influence on the cutting action of a tool. It is hoped that subsequent investigations will definitely answer many important questions. For instance, many industries would give a lot to know exactly what cutting fluid to use on a given job. Will it be possible ultimately to pick from a table the exact specifications of a cutting fluid indicated for a given operation to be performed at predetermined speeds and feeds? It certainly can't be answered in the light of our present knowledge and any improvement will make the present study well worth while.

This paper does not attempt to answer any of these questions or set up any rules. It is a preliminary report giving the results of drilling and planing tests on only one type of metal—annealed S.A.E. 3150 steel. Eleven cutting fluids whose properties are given in table 1 were used. For the present, probably the chief contribution of this paper is the summary given below. It must be understood that these conclusions are based on preliminary work subject to revision in the light of future experiment.

1. It appears that the quantity of cutting fluid delivered at the point of the drill influences the value of the torque and thrust as follows:

The lowest torque and the lowest thrust for most of the cutting fluids were obtained when the oil was sup-

Machinability; Quantity of

plied to the drill point in the greatest quantity. If only a little oil, enough for continuous flow, is applied to the drill point, somewhat higher values of torque and thrust are obtained for most oils. By pouring the oil on the drill above the work at the point where the drill penetrates the work, values of torque and thrust are obtained which correspond quite favorably to the condition of a small quantity of oil being applied to the drill point.

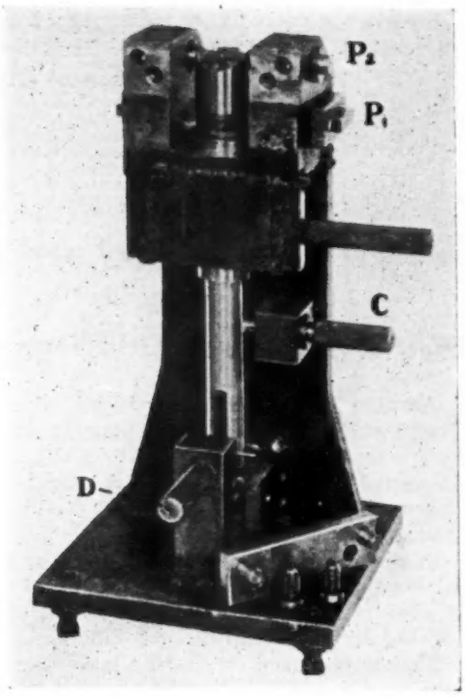
2. It appears that the torque for a given drill diameter, feed and speed varies as different cutting fluids are applied. Oil No. 9 produced a torque slightly greater than that developed when cutting dry. All other cutting fluids produced a torque less than that produced when cutting dry. The two sulphurized oils give the lowest values of torque under all conditions.

3. The thrust on a drill operating under given conditions of speed and feed varies in accordance with the specifications of the cutting fluid used. The thrust is reduced with the oils arranged in the same order as when the torque is reduced.

4. When cutting with the planer tool, it was noticed that every chip, regardless of the combination of depth and feed, had a built-up edge on the tool point when cutting dry and with all of the cutting liquids used. There appears to be little difference in the finish left by the cutting tool for a given depth and feed for different cutting fluids.

5. In planing with any given cut there appears to be little difference in the planing force for the cutting fluids as a group with Nos. 10 and 11 omitted. For this same group, the drilling torque and thrust for all drill diameters at their respective feeds and speeds showed a definite influence of the cutting fluid.

6. A newly sharpened drill produces a torque somewhat below its normal value during the first few inches of metal drilled. A normal value, or the value at which the torque remains practically constant for a considerable period of cutting, is reached sooner for a large drill diameter operating at a heavy feed than for a small drill diameter operating at a comparatively light feed.



Gaging fixture constructed from boiler plate and entirely arc welded

7. The increase in torque and thrust appears to be less marked when drilling to almost the endurance limit of the drill if the cuts are made dry rather than with a cutting liquid. The torque and thrust are lower at the beginning of a cut when a coolant is used, but both the torque and thrust increase in value faster than when the cutting is done bone dry. The torque and thrust seem to be higher just before tool failure occurs, that is, after drilling many inches of metal, when a cutting fluid is used, than when cutting dry. These are conclusions which require further proof.

Table I. Properties of Cutting Fluids Used in Progress Report No. 3

No.	Composition	Base of mineral oil	Per cent compounding by analysis	Viscosity at deg. fahr. 100	130	210	A.P.I. gravity at 60 deg. fahr.	Specific gravity	Temperature, deg. fahr. Pour	Flash	Fire
1	Dry cutting	.....	.....	...	...	...	...	.....	.....	.....	...
2	1½ per cent by weight of borax in water	.....	1.19 borax	...	...	...	...	.....	.....	.....	...
3	1 part soluble oil in 50 parts water	.....	2.3 soluble oil	31	...	...	...	.....	.....	.....	...
4	1 part soluble oil in 10 parts water	.....	8.37 soluble oil	32	...	...	...	.....	.....	.....	...
5	No. 1 lard oil	.....	12.23–13.6 F.F.A.[1] 86.4 fat	200	110	...	23.7	0.9117	45	445	...
6	Light mineral oil	Mixed	.....	111	69	40.5	23.5	0.9129	0 to –30	320–305	375
7	Heavy mineral oil	Mixed	....	209	104	45.5	23.0	0.9159	0 to – 15	340–350	390
8	10 per cent No. 1 lard oil in mineral oil	Paraffin	10.12 lard oil	101	67	41	29.4	0.8794	25	355	...
9	5 per cent oleic acid in mineral oil	Paraffin	4.90 oleic acid	97	65	40.5	29.2	0.8805	25	295	...
10	Sulphurized mineral oil	Asphaltic	4.38 sulphur	105	67	40	21.6	0.9242	0 to – 25	285	...
11	Sulphurized lard oil blended with 5 parts mineral oil	Mixed	2.34 sulphur 4.43 F.F.A. sulphurized 13.94 fat sulphurized	102	67	41.5	25.4	0.9018	25 to 20	355	...

[1] F.F.A. is free fatty acids.

Table 2. Effect of Method of Heat Treatment on the Cutting Speeds of Steel Forgings Having Equal Tensile Strengths

Test-Forging No.	Type composition, per cent	Heat Treatment	Tensile strength, 1000 lb. per sq. in.	Taylor speed, ft. per min.
	Comparison of Different Methods of Quenching and Tempering			
50A	0.36 Carbon, 3.4 Nickel	1525° F., oil; 800° F., air	121.5	226
50C	0.36 Carbon, 3.4 Nickel	1525° F., oil; 1325° F., air	116.0	243
49B	0.37 Carbon, 0.5 Chromium, 1.3 Nickel	1500° F., water; 1200° F., air	92.5	323
49C	0.37 Carbon, 0.5 Chromium, 1.3 Nickel	1500° F., water; 1325° F., air	94.7	314
48X	0.39 Carbon, 0.8 Chromium, 3.0 Nickel	1500° F., oil; 850° F., air	166.0	145
48C	0.39 Carbon, 0.8 Chromium, 3.0 Nickel	1540° F., oil; 1300° F., air	166.0	150
	Comparison of Quenched and Tempered Steels With Annealed Steels			
51C	0.42 Carbon	1650° F., water; 1300° F., air	87.5	310
51D	0.42 Carbon	1550° F., cooled slowly in furnace	78.0	310
46C	0.39 Carbon, 1.0 Chromium, 0.17 Vanadium	1650° F., oil; 1350° F., air	96.0	304
46D	0.39 Carbon, 1.0 Chromium, 0.17 Vanadium	1550° F., cooled slowly in furnace	90.4	313
47C	0.39 Carbon, 0.9 Chromium, 0.17 Molybdenum	1625° F., water; 1350° F., air	93.7	318
47D	0.39 Carbon, 0.9 Chromium, 0.17 Molybdenum	1550° F., cooled slowly in furnace	89.0	347
49C	0.37 Carbon, 0.5 Chromium, 1.3 Nickel	1500° F., water; 1325° F., air	94.7	314
49D	0.37 Carbon, 0.5 Chromium, 1.3 Nickel	1500° F., cooled slowly in furnace	89.0	329
50B	0.36 Carbon, 3.4 Nickel	1525° F., oil; 1100° F., air	105	290
50D	0.36 Carbon, 3.4 Nickel	1500° F., cooled slowly in furnace	101.6	266

Effect of Heat Treating Steel Forgings

Another important research job was "Influence of Chemical Composition and Heat Treatment of Steel Forgings on Machinability with Shallow Lathe Cuts," presented by T. G. Digges, associate metallurgist, Bureau of Standards. It concerns itself primarily with a study of high-speed-steel lathe tool performance with shallow cut as affected by variations in the chemical composition and heat treatment of the steel cut. It also includes considerations of surface finish as effected by the conditions of cutting.

The method used for testing lathe tools with shallow cuts was based on the fact that when two tools are set at equal depth in one tool holder, the second or indicating tool will not cut, so long as the leading or test tool shows no wear. With this method of test the indicating tool began to cut when the wear on the test tool was from 0.001 to 0.002 in., and this was considered as the point of failure of the test tool. In most cases it was found that the wear of 0.001 to 0.002 in. coincided with a complete breakdown of the tool comparable to that found with heavy cuts in rough turning. The measure of machinability was the cutting speed permitting a definite tool life.

The machining properties of a steel forging are recognized as being affected by (1) chemical composition; (2) heat treatment after working, and (3) quality of the metal cut, the latter referring to those details of composition not defined by ordinary chemical analysis. The data given in Table 2 show that in general the cutting speeds were not appreciably affected by the method of heat treatment by which a given tensile strength was produced. In Fig. 1 is shown the effect of changes in chemical composition upon cutting speed. It shows that these changes were dependent upon the tensile strength at which comparisons are made. The tests were made dry with 0.0115 in. per revolution feed and 0.910 in. depth of cut. Chemical composition of the forgings is given in Table 3.

Table 3. Chemical Composition of the Forgings Cut in the Lathe Tests

Forging No.	S.A.E. No.	Chemical composition,[1] per cent C	Mn	P	S	Si	Cr	V	Ni	Mo
46	6140	0.39	0.71	0.019	0.029	0.20	0.95	0.17	..	..
47	4140	0.39	0.56	0.020	0.023	0.22	0.86	..	..	0.17
48	3435	0.39	0.59	0.017	0.019	0.26	0.76	..	2.96	..
49	3140	0.37	0.64	0.021	0.024	0.20	0.50	..	1.26	..
50	2340	0.36	0.73	0.026	0.025	0.20	..	..	3.43	..
51	1040	0.42	0.65	0.020	0.015	0.19	..	..	..	..

[1] Chemical-analysis data reported by the manufacturers.

The results of these tests are briefly summarized by the author as follows:

1. Measurable and consistent differences were observed in the machinability of the carbon and alloy steels used. The fact, however, that some given steel permits a higher cutting speed than another steel for some tensile strength which is the same for both materials, does not necessarily indicate that the two steels maintain the same relationship for another tensile strength.

2. The 0.4 per cent plain carbon steel, within the range of tensile strengths obtained by heat treatments, was the most difficult to machine with shallow cuts other than an annealed nickel-chromium steel. The surface finishes of the carbon-steel forgings were also inferior to those produced on the alloy-steel forgings.

(Turn to page 879, please)

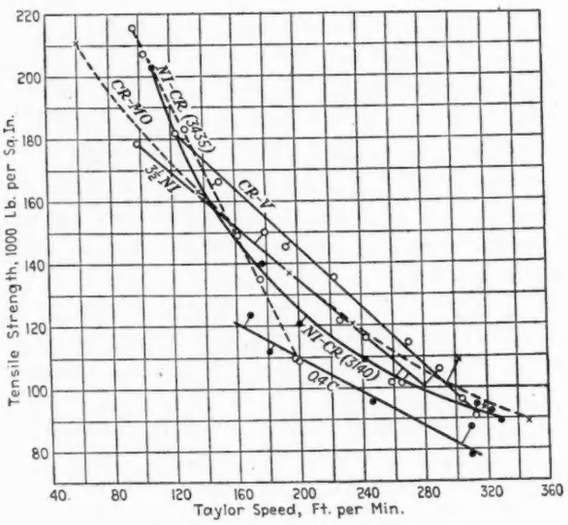


Fig. 1—Relation of the Taylor speed to the tensile strength of special steels cut in lathe tests + + +

Rapid Calculation of Bearing Loads Can Be Made With Simplified Forms

Part 2

This instalment completes the explanation of the author's system of computing bearing loads. The first part appeared in the issue of May 30.

By Robert N. Janeway

THE following derivations of the equations used in the computation are given for those interested in the mathematical development of this method.

I. Importance of PV factor.

The friction work done in a bearing in unit time may be expressed by the following equation: $F = f\,PV$

f = coefficient of friction
P = bearing load, *lbs.*
V = journal velocity, *ft./min*

Since the energy represented by the work of friction must be dissipated as heat, which is largely transferred from the bearing to the oil circulating through it,

$$F = H = KS\,(T_b - T_o) = \frac{fPV}{778}$$

K = coefficient of heat transfer, *BTU/sq. in./1°F/min.*
S = projected area of bearing, *sq. in.*
T_b = mean temperature of bearing
T_o = mean temperature of oil

$$\text{Then } T_b - T_o = \frac{1}{778}\left(\frac{f}{K}\right) \times \frac{PV}{S} \text{ or } T_b - T_o \propto {}_pV$$

where ${}_p$ = unit pressure on bearing $= {}^{P}/_{S}$

This equation signifies that the temperature difference between the bearing and the oil is directly proportional to the product of unit pressure on the bearing and journal velocity for given coefficients of friction and heat transfer.

II. Detailed Treatment of Forces

In general, all the forces involved are functions of crank-angle and so may be represented by the expression

$$F = (f)_a$$

The mean value of F between any given limits a_1 and a_2 is

$$F_m \Big]_{a_1}^{a_2} = \frac{\int_{a_1}^{a_2} (f)a\,da}{a_2 - a_1}$$

(a) *Inertia Force*

The general equation for inertia force of reciprocating mass is

$$I = .0000284\,Wr\,N^2\left(\cos a + \frac{r}{l}\cos 2a\right)$$

Where W = reciprocating weight lbs.
r = crank radius, ins.
$N = r\,p\,m$
l = length of connecting rod, ins.

If we let $A = 0000284\,Wr\,N^2$

$$I = A\cos a + A\,\frac{r}{l}\cos 2a$$

$$\text{Then } I_m \Big]_{a_1}^{a_2} = \frac{A}{a_2 - a_1}\left[\int_{a_1}^{a_2} \cos a\,da + \frac{r}{l}\int_{a_1}^{a_2} \cos 2a\,da\right]$$

$$= \frac{A}{a_2 - a_1}\left[(\sin a_2 - \sin a_1) + \frac{r}{l}(\sin a_2 \cos a_2 - \sin a_1 \cos a_1)\right]$$

Substituting the values of a_1 and a_2 for the different interyals in this equation we get

For 30 Deg. Intervals

$$I_m \Big]_{a_1=0}^{a_2=30°} = I_{m1} = A\left[3/\pi + .826\,\frac{r}{l}\right]$$

$$I_m \Big]_{30°}^{60°} = I_{m2} = \frac{2.196}{\pi}A$$

$$I_m \Big]_{60°}^{90°} = I_{m3} = A\left[\frac{.804}{\pi} - .826\,\frac{r}{l}\right]$$

$$I_m \Big]_{90}^{120} = I_{m4} = -A\left[\frac{.804}{\pi} + .826\,\frac{r}{l}\right]$$

$$I_m \Big]_{120}^{150} = I_{m5} = -\frac{2.196}{\pi}A$$

$$I_m \Big]_{150}^{180} = I_{m6} = -A\left[3/\pi - .826\,\frac{r}{l}\right]$$

For 45 Deg. Intervals

$$I_m \Big]_{a_1=0}^{a_2=45°} = I_{m1} = \frac{2A}{\pi}\left(1.414 + \frac{r}{l}\right)$$

$$I_m \Big]_{45°}^{90°} = I_{m2} = \frac{2A}{\pi}\left(.586 - \frac{r}{l}\right)$$

$$I_m \Big]_{90°}^{135°} = I_{m3} = -\frac{2A}{\pi}\left(.586 + \frac{r}{l}\right)$$

$$I_m \Big]_{135°}^{180°} = I_{m4} = -\frac{2A}{\pi}\left(1.414 - \frac{r}{l}\right)$$

Thus, using 30 deg. intervals, there are six mean values of inertia force; while using 45 deg. intervals,

there are four mean values which recur during corresponding intervals of the forward and return strokes.

(b) *Centrifugal Force*

The general equation for centrifugal force is

$$C = .0000284\ Wr\ N^2$$

At any crank angle (a) the vertical component is

$$C_V = C \cos a$$

While the horizontal component is

$$C_H = C \sin a$$

Integrating each component according to equation (1) above

$$C_{Vm}\Big]_{a_1}^{a_2} = C\,\frac{(\sin a_2 - \sin a_1)}{a_2 - a_1}$$

$$C_{Hm}\Big]_{a_1}^{a_2} = -C\,\frac{(\cos a_2 - \cos a_1)}{a_2 - a_1}$$

Substituting the values of a_1 and a_2 corresponding to the different intervals we get

Vertical Component

For 30 Deg. Intervals	*For 45 Deg. Intervals*
$C_{Vm}\Big]_{0°}^{30°} = Cm_1 = \frac{3}{\pi}C$	$C_{Vm}\Big]_{0°}^{45°} = Cm_1 = \frac{2.828}{\pi}C$
$C_{Vm}\Big]_{30°}^{60°} = Cm_2 = \frac{2.196}{\pi}C$	$C_{Vm}\Big]_{45°}^{90°} = Cm_2 = \frac{1.172}{\pi}C$
$C_{Vm}\Big]_{60°}^{90°} = Cm_3 = \frac{.804}{\pi}C$	

Horizontal Component

$C_{Hm}\Big]_{0°}^{30°} = Cm_3 = \frac{.804}{\pi}C$	$C_{Hm}\Big]_{0°}^{45°} = Cm_2 = \frac{1.172}{\pi}C$
$C_{Hm}\Big]_{30°}^{60°} = Cm_2 = \frac{2.196}{\pi}C$	$C_{Hm}\Big]_{45°}^{90°} = Cm_1 = \frac{2.828}{\pi}C$
$C_{Hm}\Big]_{60°}^{90°} = Cm_1 = 3/\pi\ C$	

Thus, we have three mean values of centrifugal force for 30-deg. intervals and two mean values for 45-deg. intervals which recur during similar intervals in each quadrant. The values are seen to be identical for both the vertical and horizontal component, except that the simultaneous values of the two components are 90 deg. out of phase.

(c) *Gas Pressure*

A pressure-volume indicator card has been constructed using as coordinates absolute pressure in per cent of theoretical maximum pressure and volumetric ratio as shown in Fig. 6. The basic data used as obtained from actual representative indicator cards were as follows:

Exponent of Expansion—$n = 1.4$ where $PV^{1.4} =$ a constant.

Exponent of Compression—$m = 1.3$ where $PV^{1.3} =$ a constant.

Theoretical maximum pressure (*abs.*) 4.65 × Compress. Pressure (absolute).

The combustion line was plotted from representative pressure-time indicator cards. It will be noted that the actual maximum pressure is about 79 per cent of the theoretical value which would be obtained if combustion were completed at constant volume. The loss due to the rounding of the card during combustion and exhaust gives a card factor of 95 per cent, i. e., the actual card area is 95 per cent of the theoretical.

It will be noted that the pressure-volume card constructed in this way may be extended indefinitely to any desired compression-expansion ratio. However, if this card be transposed to a pressure-crank-angle basis, as in Fig. 7, a different diagram will be obtained for each compression ratio, since the volumetric ratio at any crank-angle depends upon the volume at top dead-center. From these diagrams it is possible to obtain for each compression ratio the mean pressure during any crank-angle interval in terms of the theoretical maximum pressure.

It remains only to derive the general relation between the theoretical maximum pressure, the indicated m.e.p. and the compression ratio. From this equation the theoretical maximum pressure may readily be computed for any given compression ratio and indicated m.e.p.

The fundamental equation for work done during any thermodynamic change of a gas, of the form PV^n = a constant, between any two points 1 and 2 is

$$\text{work}\Big]_1^2 = \frac{P_1 V_1 - P_2 V_2}{n - 1}$$

If P_T = theoretical max. absolute pressure

P_c = absolute compression pressure

P_i = indicated *m.e.p.*

R = compression ratio $= \frac{V_2}{V_1}$

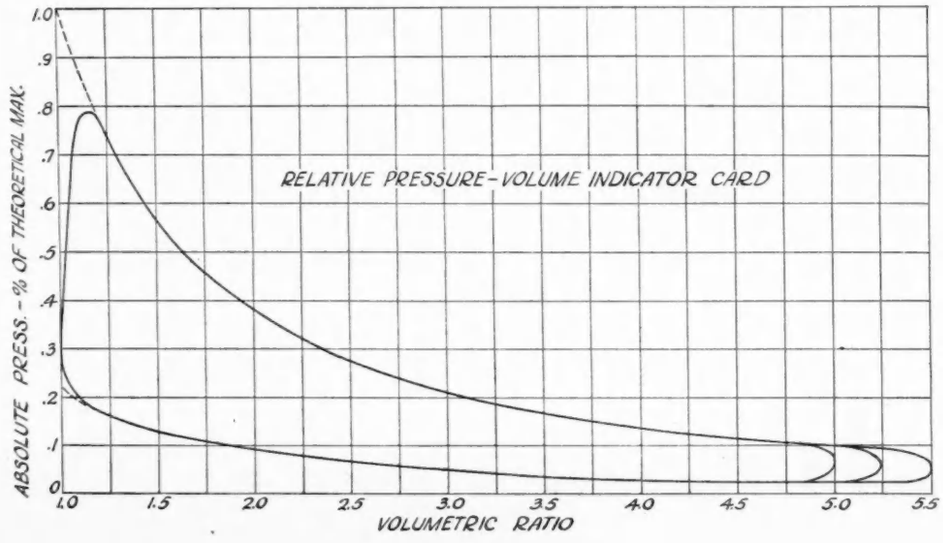


Fig. 6—Relative pressure-volume indicator card + +

Since $\frac{P}{P_1} = \frac{1}{R^n}$

Then for expansion, taking $V_1 = 1$ and $PV^n = \text{constant}$

$$\text{work}_e = \frac{P_T \times 1 - \frac{P_T}{R^n} \times R}{n-1} = \frac{P_T}{n-1}\left(1 - \frac{1}{R^{n-1}}\right)$$

and for compression, taking $PV^m = \text{constant}$

$$\text{work}_c = \frac{P_c \times 1 - \frac{P_c}{R^m} \times R}{m-1} = \frac{P_c}{m-1}\left(1 - \frac{1}{R^{m-1}}\right)$$

Since $P_c = \frac{P_T}{4.65}$ and net work $= (\text{work}_e - \text{work}_c)K$, where K = card factor = .95

$$\text{net work} = .95\, P_T \left[\frac{1 - \frac{1}{R^{n-1}}}{n-1} - \frac{1 - \frac{1}{R^{m-1}}}{4.65\,(m-1)}\right]$$

substituting the value for (m) and (n) this becomes:

$$\text{work} = .95 P_T \left[1.783 - \frac{2.5}{R^4} + \frac{.717}{R^3}\right]$$

since net work $= Pi\,[R-1]$

$$P_T = \frac{(R-1)\,Pi}{.95 \quad 1.783 - \frac{2.5}{R^4} + \frac{.717}{R^3}}$$

Thus for any given compression ratio, the theoretical maximum pressure is directly proportional to the indicated m.e.p. The actual ratios have been computed and tabulated in Fig. 3* for various compression ratios. It should be noted that the pressures in this table are derived on the absolute basis so that the effective pressures are obtained by subtracting the atmospheric pressure, as indicated.

(d) *Horizontal Components of Inertia and Gas Pressure.*

If F represents the vertical force at the wrist-pin and ϕ the angularity of the connecting rod, the horizontal component of F, $F_H = F \tan\phi$

The effective mean value of tan ϕ over an interval of crank-angle from a_1 to a_2 is

$$(\tan\phi)_m = \frac{\int_{a_1}^{a_2} F \tan\phi\, da}{\int_{a_1}^{a_2} F\, da}$$

In order to simplify this derivation, the mean values are obtained by taking F = A cos a, the equation for the primary inertia force. The application of the horizontal force factors so derived to the total inertia and pressure force involves negligible error.

We get, then,

$$(\tan\phi)_m \Big]_{a_1}^{a_2} = \frac{\int_{a_1}^{a_2} \cos a \tan\phi\, da}{\int_{a_1}^{a_2} \cos a\, da}$$

Since $\sin\phi = \frac{r}{l}\sin a$

$$\cos\phi = \sqrt{1 - \frac{r^2}{l^2}\sin^2 a} = \frac{r}{l}\sqrt{\frac{l^2}{r^2} - \sin^2 a}$$

$$\tan\phi = \frac{\sin a}{\sqrt{\frac{l^2}{r^2} - \sin^2 a}}$$

$$(\tan\phi)_m \Big]_{a_1}^{a_2} = \frac{\int_{a_1}^{a_2} \frac{\sin a \cos a\, da}{\sqrt{\frac{l^2}{r^2} - \sin^2 a}}}{\int_{a_1}^{a_2} \cos a\, da}$$

This is readily integrated, giving

$$(\tan\phi)_m \Big]_{a_1}^{a_2} = \frac{\sqrt{\frac{l^2}{r^2} - \sin^2 a_1} - \sqrt{\frac{l^2}{r^2} - \sin^2 a_2}}{\sin a_2 - \sin a_1}$$

Substituting in this equation the values of (sin a) corresponding to the limits of the various crank-angle intervals, the following values are obtained for the mean horizontal component factor, (h) where $F_{Hm} = h\,(P_m + I_m)$ and P_m = mean gas pressure I_m = mean inertia force.

For 30 deg. intervals

$a_1 - a_2$	h
0 — 30°	$h_1 = 2\frac{l}{r}\left[1 - \sqrt{1 - r^2/4l^2}\right]$
30 — 60	$h_2 = 2.73\frac{l}{r}\left[\sqrt{1 - r^2/4l^2} - \sqrt{1 - 3r^2/4l^2}\right]$
60 — 90	$h_3 = 7.45\frac{l}{r}\left[\sqrt{1 - \frac{3r^2}{4l^2}} - \sqrt{1 - r^2/l^2}\right]$
90 — 120	$h_4 = h_3$
120 — 150	$h_5 = h_2$
150 — 180	$h_6 = h_1$

* See page 834, *Automotive Industries*, May 30.

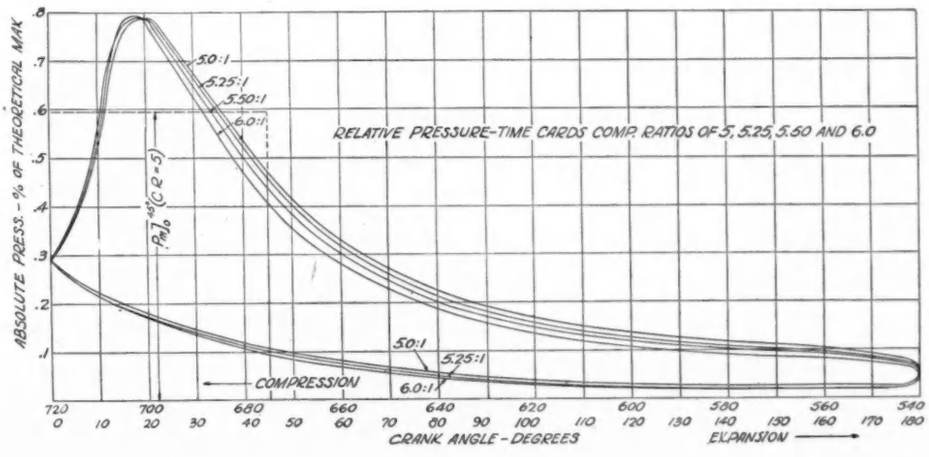


Fig. 7—Relative pressure-time cards for compression ratios 5, 5.25, 5.50 and 6 + +

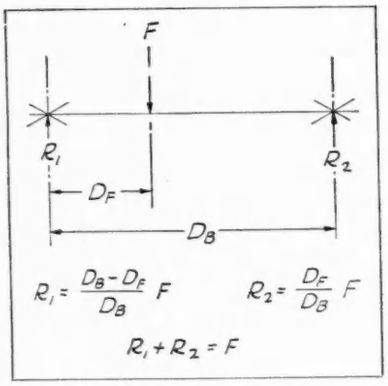


Fig. 8 — Bearing reaction factor + +

For 45 deg. intervals

$a_1 - a_2$	h
0 — 45°	$h_1 = 1.415 \frac{l}{r}\left[1 - \sqrt{1 - r^2/2l^2}\right]$
45 — 90	$h_2 = 3.42 \frac{l}{r}\left[\sqrt{1 - r^2/2l^2} - \sqrt{1 - \frac{r^2}{l^2}}\right]$
90 — 135	$h_3 = h_2$
135 — 180	$h_4 = h_1$

The value of (h) is obviously the same for similar intervals in all quadrants, so that each value of (h) is repeated four times throughout each revolution.

(e) *Main Bearing Reaction Factors*

In determining the main bearing loads, the free body method is used which treats each section of the crankshaft included between adjacent bearings as an independent simple beam, so that each force produces reactions only on the two bearings between which it acts; then, if D_f = the distance of the point of application of a force F, to the center of a particular bearing; D_b = the distance from center to center of the two bearings between which the force acts.

R = reaction of the bearing in the opposite direction to that of the force.

Then, taking moments about the adjacent bearing, (see Fig. 8)

$$R\,D_b = F(D_b - D_f)$$

$$R = \frac{D_b - D_f}{D_b} F$$

$$\frac{D_b - D_f}{D_b} = K = \text{bearing reaction factor.}$$

(f) *Reduction of Crank-shaft Throw to Equivalent Crankpin*

In the determination of main bearing loads the centrifugal forces set up by the crankshaft must be included with the forces acting upon the crankpins.

For the purpose of simplifying the handling of these forces it is desirable to reduce the total throw to an equivalent mass at the crankpin center of gravity which will produce the same reactions on the bearings.

Thus, in Fig (2) R_1, R_2 and R_p are the radii of rotation, and W_1, W_2 and W_p, are the eccentric weights respectively of the two checks and of the crankpin.*

The first step is to obtain the equivalent weights of W_1 and W_2 if concentrated at the center line of the crankpin.

Then, since centrifugal force is directly proportional to the product of weight and radius of rotation,

$$R_1 W_1 = R_p W_1^1 \text{ and } R_2 W_2 = R_p W_2^1$$

where W_1^1 and W_2^1 are the equivalent weights at R_p

$$\text{Therefore, } W_1^1 = \frac{R_1}{R_p} W_1 \text{ and } W_2^1 = \frac{R_2}{R_p} W_2$$

and the total weight of equivalent crankpin, $W_e^1 = W_p + W_1^1 + W_2^1$

The next step is to locate the lateral center of gravity of the equivalent crankpin with respect to the center line of the pin.

If Y_1, Y_2 and Y_e denote the lateral distances of the center of gravity respectively of W_1^1, W_2^1 and W_e^1 from the lateral center line of the pin, then, taking clockwise rotation as positive,

$$W_2^1 Y_2 - W_1^1 Y_1 = W_e^1 Y_e$$

$$\text{and } Ye = \frac{W_2^1 Y_2 - W_1^1 Y_1}{W_e^1}$$

*In the case of a shaft having counterweights in the plane of the throw this effect should be deducted from that of the throw itself. See page 834, *Automotive Industries*, May 30.

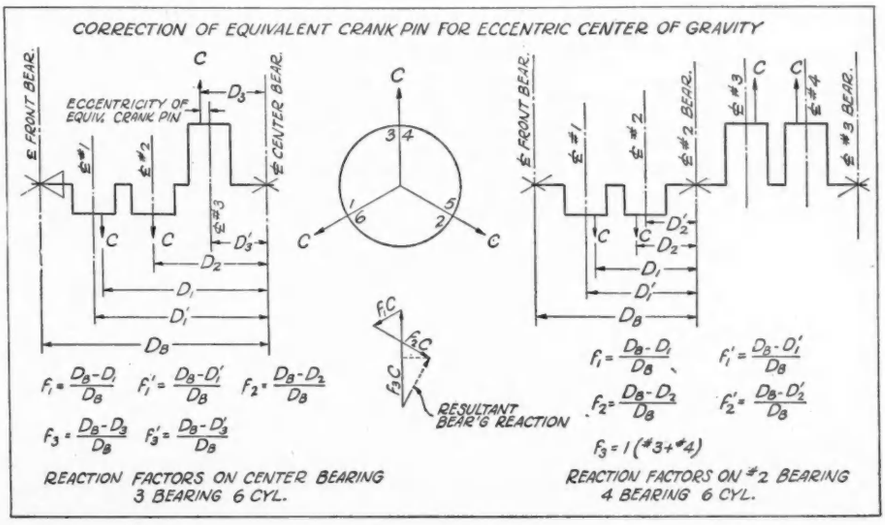


Fig. 9 — Correction of equivalent crankpin for eccentric center of gravity + + + +

Note—Small f in this diagram corresponds to capital K in the formulae in the text.

(g) *Correction of Equivalent Crankpin for Eccentric Center of Gravity*

It is obvious that the center of gravity of the equivalent crankpin will coincide with that of the crankpin itself only if the two cheeks forming the crank throw are uniform. In most crankshafts the cheeks of all or part of the throws are not uniform. In this case the division of the resulting centrifugal load between the supporting bearings is different from that of the forces applied at the crankpin. In the case of the 5-bearing eight-in-line engine to reduce the centrifugal forces of the throws to equivalent values applied at the crankpin centers:

If d_f = the actual couple arm

d_c = the center distance between crankpins

W_e^1 = weight of equivalent crank piece at couple arm, d_f

W_e = corrected equivalent crank piece at couple arm, d_c

Then, since the centrifugal force is proportional to the rotating weight

$$W_e^1 = d_f = W_e\, d_c$$

$$W_e = \frac{d_f}{d_c}\, W_e^1$$

The equivalent crankpin, W_e may then be added to the big end of the rod giving a single set of values for all centrifugal forces per unit cylinder.

In the case of the six-throw crankshaft with either three or four bearings the correction is more difficult because the throws included between bearings are not in the same plane. However, since the centrifugal forces of the several throws are in fixed relation to each other they combine to produce a resultant reaction on each bearing which is constant in magnitude although varying in direction with rotation of the shaft. Fig. (9) shows diagrammatically half of a three-bearing and of a four-bearing six-cylinder crankshaft, with the locations of the true centers of gravity of the equivalent crankpins.

If C^1 be the centrifugal force of each throw, which must be uniform for balance requirements, and K_1^1, K_2^1 and K_3^1 the percentage of the force of the respective throws carried by the intermediate bearing in the four-bearing shaft and by the center bearing in the three-bearing shaft; and K_1, K_2 and K_3 the percentages of the force of the respective throws carried by the same bearings if applied at the crankpin centers. Then, adding the components of the three reactions in the plane of #3 throw, we have,

$$C^1 \left[K_3^1 - \frac{1}{2}(K_2^1 + K_1^1) \right] *$$

and adding the components in a plane normal to that of #3 throw, we have,

$$C^1 .866\,(K^1{}_2 - K_1^1)$$

The resultant between these two reactions, in planes at right angles to each other, is equal to the square root of the sum of the squares, or

$$R^1 = C^1 \sqrt{\left[K_3^1 - \frac{1}{2}(K_2^1 + K_1^1) \right]^2 + \left[.866(K_2^1 - K_1^1) \right]^2}$$

Likewise, the resultant reaction if the centrifugal forces are applied at the crankpin centers, where C = the equivalent centrifugal force, is

$$R = C\sqrt{\left[K_3 - \frac{1}{2}(K_2 + K_1) \right]^2 + \left[.866\,(K_2 - K_1) \right]^2}$$

and, if the resultants in the two cases be made equal to each other

$$\frac{C^1}{C}\sqrt{\frac{\left[K3 - \frac{1}{2}(K_2 + K_1) \right]^2 + \left[.866\,(K_2 - K_1) \right]^2}{\left[K_3^1 - \frac{1}{2}(K_2 + K_1^1) \right]^2 + \left[.866\,(K_2^1 - K_1^1 \right]^2}} = \frac{We^1}{We}$$

The same correction factor applies with equal accuracy to the reactions on the end bearings.

It should be noted here that in the case of the four bearing shaft throws #3 and #4 are in phase and symmetrical with respect to a centerline between the intermediate bearings. Each intermediate bearing therefore carries one-half the combined centrifugal load regardless of the offset of the center of gravity of the equivalent crankpin. Hence, for this case, in the above equation, $K_3 = K_3^1 = 1$

*Capital K are shown as small f in the accompanying diagram in Fig. 9.

A. S. M. E. Meets at Hartford

(Continued from page 874)

3. The superiority in cutting speeds of the alloy steels over the plain carbon type is not to be attributed solely to any single alloying element, but rather to the combined effects of the alloying elements present in any particular steel, considering carbon also as one of the alloying additions.

4. The results of the present tests with shallow cuts, compared with previously reported tests with roughing cuts, show that the effect of change in chemical composition of steel forgings upon their cutting speeds is dependent not only upon the tensile strength at which comparisons are made, but also upon the conditions of cutting.

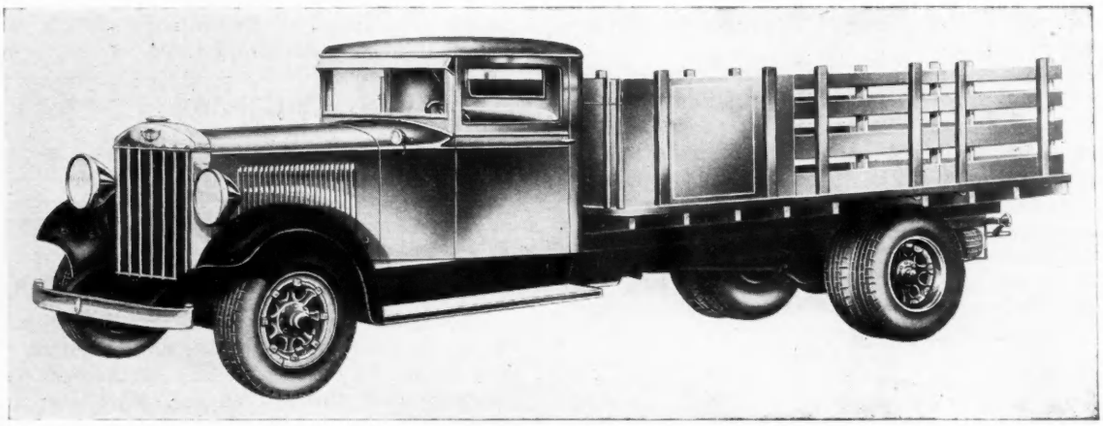
5. Lathe-tool performance with shallow cuts was improved by the additions of cobalt (together with higher hardening temperatures) to the customary 18 per cent tungsten type of high-speed-tool steel. The maximum gain in performance was shown when cutting the forgings with tensile strengths up to about 170,000 lb. per sq. in., but above this strength the gain in performance was not so marked.

6. A correlation of the cutting speeds, tool life, surface finish, etc., shows that, with the test method used, the machinability of the carbon and different alloy-steel forgings used in the experiments may be properly determined or measured by the cutting speed permitting the tool to last a definite time.

The importance of small tools and inspection devices in interchangeable manufacture was the theme of papers read by Thomas F. MacLaren of Browne & Sharpe and E. J. Bryant of Greenfield Tap & Die.

Mr. MacLaren's paper, as its title "Conventional Gages and Their Application to Duplicate Production" indicates, is a brief analysis of the importance of accurate primary gages. He emphasized the necessity of getting three-point contact for cylindrical parts. He mentions several large gaging fixtures, one of which is illustrated, constructed from boiler plates and entirely arc welded.

Mr. Bryant brought out an interesting detail. The length of chamfer on the tap has an important bearing on production, not only in the size of hole produced but also in the life of the tap. In general, the short chamfer tap has more tendency to free itself, but the long chamfer tap cuts closer to size.



The 4-ton model has a standard wheelbase of 170 in. and a gross weight of 20,000 lb.

Reo Offers Seven New Truck Models

A 1½-TON four-cylinder speedwagon at $625; a 1½-ton six-cylinder speedwagon at $725, and a 101-hp., 4-ton truck are new products just introduced on the market by the Reo Motor Car Co. While the addition of the 4-ton model extends the Reo line of commercial vehicles into the higher capacity range, the two new 1½-ton models place Reo in competition for business in the low-priced field not formerly touched by it.

Both of the 1½-ton models are of attractive appearance, and both are said to be made up exclusively of units specially designed for commercial vehicle service. In both powerplants, the four and the six, there is a main bearing on each side of each crank throw, the four-cylinder having five main bearings and the six-cylinder seven. Aside from being thus well supported, the crankshafts are of robust design, that of the four-cylinder engine having 3-in. bearings, and that of the six, 2½-in. Following long-established Reo practice, all cylinder blocks are of nickel iron. Engine lubrication is by the pressure system, which extends even to the piston pins. Pistons are of semi-steel. The four-cylinder develops 57 hp. at 2800 r.p.m., and the six-cylinder 61 hp. at 3000 r.p.m. The cellular radiators are V-shaped, as on recent Reo passenger cars, to add to the attractiveness of appearance, and they carry a vertical-vane type of grill.

The transmission, which is of the four-speed type, with a 6.6 to 1 ratio in low, is of heavy-duty design, and the same applies to the axles, according to the manufacturers.

The gross weight rating of the 1½-ton truck with either engine is 8000 lb., and the factory specifications state that the maximum payload is 4000 lb., which would seem to make the regular rating of 1½ tons quite conservative.

With a rated payload of 8000 lb., the new four-ton truck comes in three wheelbases, 150, 170 and 190 in. The shortest wheelbase is available either in a dump body or as a six-wheel tractor unit. Standard wheelbase is 170 in., for which the gross weight is given as 20,000 lb. This model is furnished standard with 8.25/20 in front and 9.00/20 in dual balloons at the rear.

Specifications of all three models are given below:

Specifications of the New Reo Trucks

	1½ Ton		4 Ton
	Model 1-A&C	Model 1-B&D	Models H-J-K
No. of cyls.	4	6	6
Chassis price	$625	$725	.....
Std. wheelbase	136-in.	136-in.	170-in.
Max. wheelbase	160-in.	160-in.	190-in.
Gross weight	8,000 lb.	8,000 lb.	20,000 lb.
Tires, front	6.00/20	6.00/20	8.25/20
Tires, rear	32 x 6	32 x 6	9.00/20 dual
Bore and stroke	3 3/16 x 4½	3⅜ x 4	4⅛ x 4¾
Piston displace.	205 cu. in.	214.7 cu. in.	381 cu. in.
Taxable hp.	23.3	27.34	40.8
Max. hp.	57 at 2,800 r.p.m.	61 at 3,000 r.p.m.	101 at 2,600 r.p.m.
Valve arrangmt.	L-head	L-head	L-head
No. main brngs.	5	7	7
Crankshaft di.	3-in.	2½-in.	3-in.
Camshaft drive.	gear	gear	gear
Pistons, type	semi-steel	semi-steel	semi-steel
Lubrication	full pressure	full pressure	full pressure
Oil capacity	4 qt.	6 qt.	10 qt.
Carburetor size.	1¼-in.	1¼-in.	1¾-in.
Fuel feed	pump	pump	pump
Gas tank capacity	15.-gal.		25-gal.
Cooling system	centrifugal pump		cent. pump
Electrical units	Delco-Remy		Delco-Remy
Battery capacity	84 amp. hr.		119 amp. hr.
Clutch type	single plate		double plate
diameter	10-in.		11-in.
Transmission type	4-speed		4-speed

	1½ Ton		4 Ton
	Model 1-A&C	Model 1-B&D	Models H-J-K
low gear ratio	6.6 to 1		6.6 to 1
overall reduction	36.96 to 1		41.58 to 1
Propeller shaft diam.	3½-in.		2½-in.
Axle type	full floating		full floating
Final drive type	Spiral bevel		Spiral bevel
standard ratio	5.1 and 5.6		6.375 to 1
torque & propulsion.	Hotchkiss		Hotchkiss
Front axle	I-beam		I-beam
end type	Reverse Elliott		Reverse Elliott
Steering gear	Ross cam and lever		Ross cam & lev.
wheel diameter	17-in.		20-in.
Brakes, type, service.	4-wheel hydraulic		4-wh. hydraulic with BK bstr.
drum size, front	14 x 1¾ in.		16 x 2¼ in.
drum size, rear	15 x 2¼ in.		17¼ x 4 in.
Hand brakes, type	ext. prop. shaft		disk, prop. shaft
Spring, front	40 x 2 in.		44 x 3 in.
rear	50 x 2½ in.		56 x 3½ in.
type	semi-elliptic		semi-elliptic
helpers	extra		standard
Wheels	spoke steel		malleable
Tread, std. front	58 9/16-in.		64-in.
rear	56¼-in.		69¾-in., mean
Frame type	straight channel		straight chan.
max. depth	7-in.		10-in.
flange width	2¾-in.		3-in.
stock, short W.B.	5/32-in.		¼-in.
stock, long W.B.	3/16-in.		¼-in.

PRODUCTION LINES

Staples mounted in parallel are now being used by several body companies to tack upholstery material to the backs of cardboard panels, etc. At the left are eleven No. 176 Tackers, made by Markwell Stapling Devices, New York, N. Y., operated by means of a foot pedal. The spring on the staple feed bar can be retracted so that any one or any number of the setup can be cut out + +

Zirconium Improves Ductility

Maybe this will score a hit with the press shop. Experiments show that zirconium—a new alloying element—improves ductility. Good deep drawing properties are said to be imparted in the steel sheets thereby, according to Frederick M. Becket in *Mining and Metallurgy*, May, 1931.

Boosts Dodge Efficiency

Dodge Bros. has just made some big changes in their truck plant. High cycle electric tools installed on the assembly line have increased overall efficiency by 25 per cent. Chalk up another for high cycle tools.

Another radical change is the substitution of lacquer for enamel in finishing the truck chassis. Savings in space, oven heat, etc., have more than offset the difference in cost of materials.

Fixtures for Speed

Frank Curtis of K & T is doing some remarkable work in the design of fixtures for tungsten-carbide milling. Of what avail is high-speed milling when your fixtures are old-fashioned? His fixtures are husky, rigid, quick as a flash. One movement of a single lever usually lines up the work, locks it in place and holds it rigid. The reverse motion releases for unloading almost instantaneously.

Tap to Do the Trick

Do you want to eliminate lead error in production threading? Greenfield Tap & Die Corp., Greenfield, Mass., says their Tru-Lede tap will do the trick. These taps are carefully made from high-speed steel, ground after hardening. The lead tolerance is said to be 0.0005 in. in 1 in. of thread. Pitch and major diameter of tolerances are Class 2 fit, the same as cut thread tap practice.

Modernized Old Ones

Can some of the old line-driven machine tools be modernized? Yes, says the Production Equipment Co., Cleveland. They have just brought out a line of motorized countershafts. Compact, individual motor drives can now be fitted on almost any belt-driven machine in your shop. Sounds like a good idea in the right place.

About Lumber

Results of a wide survey of practice in handling lumber in various industries including some large automotive plants. Published by the Department of Commerce in a pamphlet, "Seasoning, Handling, and Care of Lumber" (fabricator's edition). Some valuable information is given concerning current practice in storing and kiln drying with description and photographs of equipment. Considerable space is devoted to moisture content, humidity control, and related problems. Another section deals with the handling of dimension stock.

Where Women Weld

Welding practice in Europe, according to one observer, is about five years behind ours. However, they are highly proficient in gas welding, which is done by female operators in France and Germany.

Many of us have had the idea that European machine tools have something on ours. There is just nothing to it. Large producers, such as Citroen, Renault and others in that class, are using U. S. machines for all high production processes such as welding, stamping, etc.—J.G.

MANUFACTURING MANAGEMENT METALLURGY

Centrifugal Casting Process Produces Having Superior Wearing Qualities

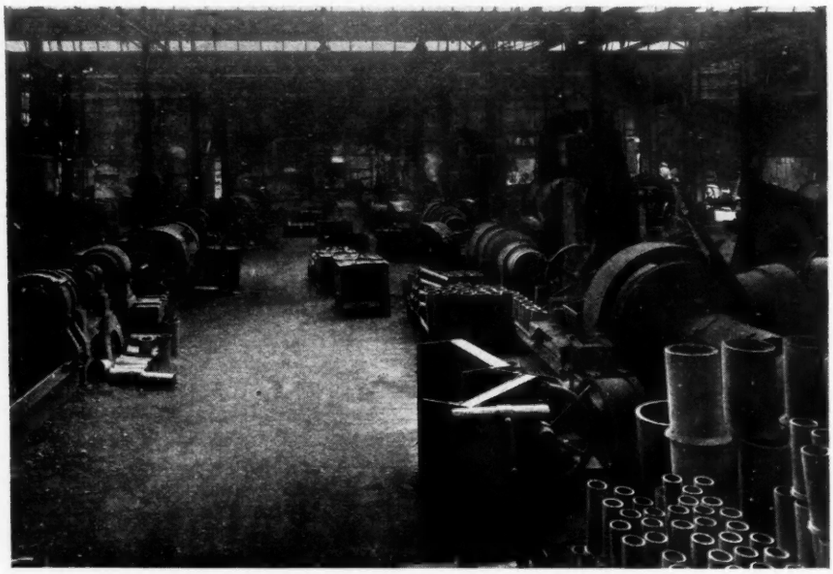


Fig. 1—A view at the main casting shop of the Sheepbridge Stokes Centrifugal Castings Co., Ltd. + +

Mr. F. W. Stokes, Managing Director, Stokes Castings, Ltd., and the Sheepbridge Stokes Centrifugal Castings Co., Ltd., has volunteered to cooperate with American manufacturers who might be interested in centrifugal casting developments

THE application of the centrifugal casting process to the production of cylindrical castings for such high duty purposes as cylinder liners, valve seat rings and the like, for all classes of engines, compressors and pumps, has been developed very extensively by the Sheepbridge Stokes Centrifugal Castings Co., Ltd., at their works, Chesterfield, England.

The principles embodied in the centrifugal casting process are familiar to most engineers and foundrymen and it will be appreciated readily that the special properties of cast iron produced by this process are admirably suitable for the production of the above-mentioned castings to withstand rigorous service conditions.

A view in the main centrifugal casting shop of the works of the company is shown Fig. 1, whilst Fig. 2 is an illustration of one of the small size overhung type centrifugal casting machines. In the operation of these machines the molten metal takes the required form of the mold by virtue of the centrifugal force, and as a result of using metal molds comparatively rapid solidification of the molten metal is obtained.

It is of extreme importance to note that the solidification of the metal, in addition to being rapid, takes place under a considerable amount of pressure due to the centrifugal force. These conditions, as is well known, are just those under which the finest possible crystals are obtained from any crystallizing liquid, and the solidified centrifugally cast metal has therefore an extremely fine crystalline structure. The metal molds used in this process are rotated about their horizontal axis. Castings produced by the introduction of molten metal, and the filling of molds rotated in this manner, can be considered to be virtually built up of successive laminae of molten metal. In this

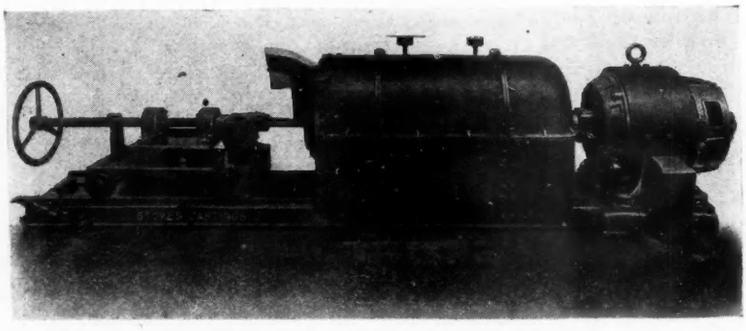


Fig. 2—Sheepbridge patented centrifugal casting machine + + + + + + + +

Cylinder Linings

by J. E. Hurst

Technical Director
Sheepbridge Stokes Centrifugal Castings Co., Ltd.

operation the solidification of a cylindrical casting takes place in a manner notably different from that of a similar sand casting.

In the case of the centrifugal casting, neglecting the end effects, the casting solidifies from the outside surface to the inside surface direct, whereas in the sand casting, neglecting end effects, the solidification commences simultaneously on both the inside and outside surfaces leaving a liquid core which solidifies slowly owing to the existence of the previously solidified outer layers of metal. This feature in sand castings results in considerable variation in structural characteristics from one side of the casting to the other, and this variation is for the most part responsible for the distortion effects and the difference in behavior of machined cylinders from such castings. In addition, shrinkage defects and subcutaneous blowholes due to the defective feeding of the inner central portion in sand casting are obviated in centrifugal castings.

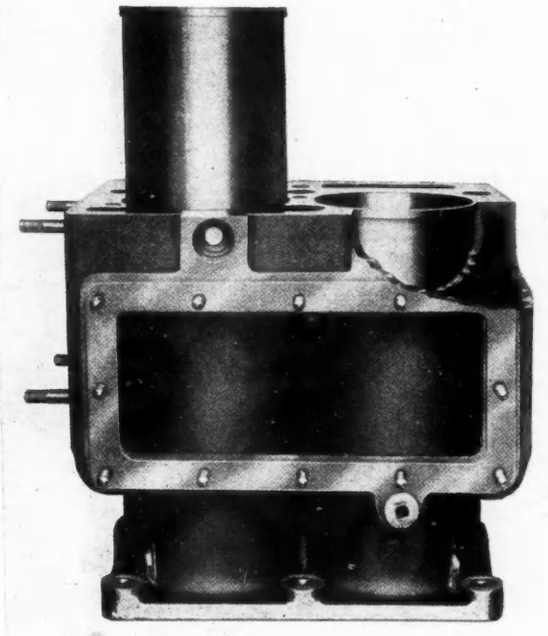


Fig. 3—Dry type liners are pressed into finished cylinder bores + + + + + +

For heavier castings such as those used for locomotive piston valve liners and large piston ring drums, the composition of the material complies with the requirements of the spun-sorbitic process, the patent for which is owned by the company. Spun-sorbitic material is centrifugally cast and is a low silicon material possessing a complete eutectoid structure. For such castings as locomotive piston valve liners it is specially cooled after solidification with the object of developing the sorbitic structure.

Fig. 4—Another group of cylinder and sleeve valve liners. Note variety of sizes and non-symmetrical forms + + + + + +

Spun-sorbitic material combines all the advantages of the centrifugal casting process with pearlitic cast iron, and eliminates the principal disadvantages of pearlitic cast iron produced by certain methods, viz.: the large grain size. The spun-sorbitic process also goes a step further in that the eutectoid constituent is produced in the finely divided or sorbitic form which is well known to be highly resistant to wear. The effect of the centrifugal process in producing cast iron of an exceptionally close grain needs no elaboration here, and it can readily be appreciated that this effect, accompanying a material of low silicon content and an "all pearlitic" or sorbitic structure, constitutes a distinct advance in the production of cast iron for internal combustion engines and other cylinder liners.

The excellent mechanical and wear-resisting properties of centrifugally cast material are taken advantage of in the production of the "Centricast" liners which may be justly claimed as having revolutionized the practice of engine cylinder-block construction for automobile and commercial vehicle engines. The obvious disadvantage in the ordinary monobloc cylinder construction is that its complexity and difficulty as a casting problem render the question of the suitability of the material to withstand the wearing conditions of modern practice a secondary consideration.

The more strenuous demands of modern automobile engine construction brought about by such considerations as increased piston speed, the use of aluminum alloy pistons, particularly in commercial vehicles, have led designers to reconsider the question of cylinder design in which the cylinder bore can be made more definitely wear-resisting. Two alternative methods of construction present themselves. One is now known as the "wet" liner method in which the cylinder barrels are constructed separately and

inserted into a more or less simple form of outer casing or water jacket. The alternative method utilizes the existing type of monobloc cylinder casting, into the cylinder bores of which thin liners are pressed. This is known as the "dry" liner method. The "dry" liner is a cylinder of approximately 1/16 in. in thickness, and has a small flange on one end. The outside of the liner is ground to close limits but the bore is left with an allowance for grinding after fitting. The cylinder itself is bored out a few thousandths of an inch smaller than the liner, so that there is an interference fit between the cylinder and the outside of the liner when the latter is pressed in, thus providing a tight fit. A recess is also machined at the upper or lower end of the cylinder (depending on whether the head is detachable or fixed) to accommodate the flange on the liner, and so insure there being no movement. When finally in position the liner is accurately ground to the correct size.

To those responsible for maintaining at a minimum the running costs of a fleet of motor vehicles, the advantages of employing replaceable cylinder liners of exceptional hardness, as compared with grinding out the cylinders and fitting oversize pistons, will be obvious. In the first place the convenience of being able to keep to standard size all the bores of any particular make of engine, and so obviate the use of oversize pistons, will be readily appreciated.

The long life of "Centricast" liners minimizes the number of times an engine requires to be taken down for cylinder wear, and oil consumption is also considerably decreased, since the pistons remain tight for a much longer period than with the original cylinder material. The engine also maintains its power and efficiency over a much longer period by reason of the bores remaining parallel and compression constant. Moreover, in the case of a single cylinder becoming scored or damaged by the wrist pin working loose, it is no longer necessary to go to the expense of having all the bores ground out and oversize pistons fitted throughout.

It has now become general practice to have a liner fitted to the defective bore and ground to the same size as the remaining bores and the same pistons used. In order to cope with the demand for centrifugally cast liners finished machined, the company has laid down an extensive machine shop equipped with the most up-to-date precision machines. The accurate machining and finishing of the "dry" liners and the method of insertion into the cylinder blocks are effected by special methods devised by the company. Fitting of the liners is also carried on by associated companies in London and Glasgow and by numerous fitting agents in the principal large towns and industrial centers.

The growing interest in materials essentially harder than standard material to B.E.S.A. Specification 4K6 is met by the use of alloy cast irons. The "Centricast" Mark II material, which is a special alloy cast iron, is designed to meet most of the requirements in this direction. It contains essentially the elements manganese and chromium, and can be used either in its normal "as-cast" condition or in the oil-hardened and tempered condition.

In the "as-cast" condition the material has a Brinell hardness ranging from 260 to 320. Within this range, the material can be machined economically, and inserted liners can be finished by reaming and honing. In the hardened and tempered condition a still higher degree of Brinell hardness can be obtained ranging from 320 to 475 according to the tempering treatment adopted. The hardening and tempering of Mark II material are best performed by heating the liners to a temperature of 850° C. and quenching in oil.

The tempering operation is effected by heating to the desired temperature for a period of from 10 to 15 min. Within limits, selective hardening may be practised. For example, in those cases where liners require deep connecting rod clearances to be cut in position when the liner is inserted in the block, it is possible to leave this portion of the liner unhardened by quenching the heated liner to a predetermined depth.

This special cast iron has been developed by the Sheepbridge Stokes Centrifugal Castings Co., Ltd., under the sole license from Nitralloy Limited. The nitralloy cast iron is an alloy cast iron which is capable of being surface hardened by the nitrogen hardening process. The hardness of the hardened surfaces of cylinder liners treated is approximately 1000 Brinell.

The centrifugal process is applied by this company under sole license from Nitralloy Limited for the production of centrifugal castings in nitralloy steel. Such steel when cast by this process is capable of being nitrogen hardened after suitable heat treatment. The hardness value attained on the hardened surfaces of such articles is in the neighbourhood of 1100 Brinell.

Fitting of cylinder liners to worn or damaged cylinder bores has been so successful that those responsible for engine maintenance are requiring similar treatment of the valve seats. The material of the cylinder block itself often reveals its weakness at these positions, particularly at the exhaust seatings, where extremely hot gases and continual hammering of the valves cause rapid wear and pitting.

By the fitting of new seats made from "Centricast" material, the cylinder block at these points can be restored to a condition not merely equal to new, but very much better than that of the original block. Exhaustive trials have proved that special centrifugal cast iron has the highest wear-resisting properties under the severe conditions to which the valve seatings are subjected, and valve seats made from "Centricast" material will give upwards of double the life of seats cast integral with the cylinder block.

As in the case of dry liners, renewable valve seats are fitted with an interference allowance by pressing into a recess bored in the cylinder block, as in Fig. 5.

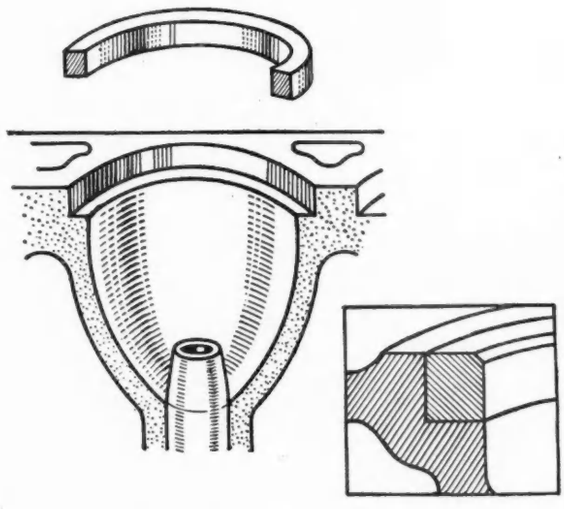


Fig. 5—This method of fitting renewable valve seats is an aid in maintenance, particularly on heavy-duty jobs + + + + + + + +

Traveling billboards carrying advertising posters are source of revenue for operators. Advertising company, working with operators' groups, proposes to handle all detail in selling space in three-fold cooperative program

Truck Association Members Offered Added Income Through Sale of Space

TRUCK ASSOCIATIONS are offered a new plan for selling memberships, and their members are offered increased sources of revenue through a plan recently propounded by the Allen W. Church Co., Rrand Rapids, Mich., advertising agency.

Taking a leaf from the book of the Railway Express Agency, this company plans to utilize the sides of suitable trucks as a medium for carrying Co., Grand Rapids, Mich., advertising agency.

Inasmuch as it would be impossible for the advertising agency to contact individually the trucks operating throughout the country, the plan was devised of working through truck associations.

The utilization of the sides of a truck for the production of revenue to the truck operator is obviously an advantage to that operator so long as it does not interfere with any advertising of his own business that he may care to carry. It is on this basis that the advantage of this plan, from the point of view of the truck association, appears.

The agency comes into a given territory and gives to the association exclusive rights for that territory and for the type of operators who are logical members of that association.

In order for a truck operator to receive the advantages of this additional revenue it is incumbent upon him to join the association. In almost all cases the revenue which the operator will receive from the sale of the advertising space on the sides of his vehicles will more than cover his dues to the association, and in some cases, two or three times over.

This plan works to the advantage of all parties concerned. The advertiser, operating through the agency, which in turn operates through the truck associations, has at hand immediately a large fleet of trucks furnishing the medium. The association can use this service as a membership inducement, point out to prospective members the fact that their investment in dues will be more than returned by this additional revenue. The truck operators, of course, receive the additional revenue, so that the advantage is three-fold.

The Merchant Truckmen's Bureau of New York has just announced to its members that if they enter into the plan, they will receive $75.58 per year per truck. The bureau will receive $3.98 per truck per year as a service fee. On May 25 the executive committee of the bureau endorsed the Church Agency plan.

After the agency has given its franchise to an association, the actual contracts for the placing of advertising on the trucks are made with the operators individually. The contract specifies that the operator shall receive a certain percentage of the gross receipts from the advertising his truck carries. Further, in order that the truck operator may be assured that he is getting the full amount due him, certified copies of the agency's contracts with the advertiser are furnished to the operator.

Advertising is carried on panels supplied by the agency, one on each side of the truck. These panels come in three sizes—30 in. by 36 in., 48 in. by 60 in., and 48 in. by 120 in. No more than one advertisement will be carried at a time, and these will be lithographed posters.

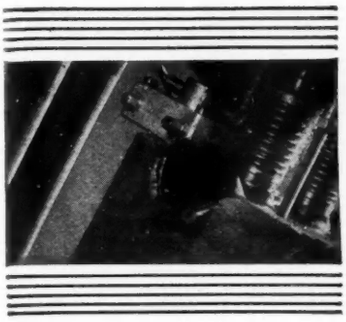
The advertising agency will handle all the details of placing the panel on the truck and of changing the advertising matter periodically. There will be no expense to the truck operator, and this work will be handled by the agency at the convenience of the operator.

Obviously, not all types of trucks are suited to carrying this type of display advertising, and for that reason, the agency reserves the right to decide what trucks shall be used.

Where the operator decides to carry his own advertising on the truck but still wants to carry this service, it will be possible, by using one of the smaller panels, to carry the display advertising, and the operator's own advertising can then be placed on the body of the truck. However, the contract specifies that no advertising other than that placed by the agency shall be carried on the trucks using this service.

Automotive Oddities—By Pete Keenan

FRONT AND REAR DRIVE. THIS IMPORTANT PERSONAGE ENJOYS TRAVEL ON HIS ONE WHEEL CARRIAGE.- AND NO SHOCK ABSORBERS. SEOUL, KOREA.
Schraderstown News.
ONE STATE IN U.S.A HAS A MINIMUM AGE OF TWELVE FOR DRIVERS LICENSE.
AVIATION PATENTS ARE ISSUED IN THIS COUNTRY AT THE RATE OF THREE A DAY.
TWO COUNTRIES AND THREE STATES IN EIGHT SECONDS WAS THE RECORD RECENTLY SET BY PETE DE PAOLO.
A MAN NAMED GOODSPEED HOLDS THE AMERICAN RACING RECORD CLASS B FOR ONE KILOMETER. MADE AT DAYTONA BEACH ON APRIL 22- 1921.



NEWS OF THE INDUSTRY

Truck Shippers' Brief Opposes Regulation

File Brief With I.C.C. for Record

WASHINGTON, June 4—There is no demand from the public, or in its interest, requiring regulation of the interstate common carrier motor truck, declares a brief filed with the Interstate Commerce Commission by the Interstate Motor Carriers' Association in connection with the investigation regarding coordination of motor transportation.

It is pointed out that there is now no monopoly of the highways because of the numerous motor carriers in open competition over them and that regulation would force monopoly and restrict development of motor truck highway transportation.

Other points made in the brief are:

1. That the interstate common carrier truck, under regulation, would be the helpless prey of the private carrier, contract and privately owned truck.

2. That it is unlawful, under the Clayton anti-trust laws, and would be against the public interest for the railroads directly or indirectly to control commerce over the highways.

3. That taxes and license fees are a matter for state administration and have no part in this proceeding, nor would increase in taxes or fees on motor trucks be economic or in the public interest.

(Turn to page 891, please)

May Output Estimated

NEW YORK, June 5—Production of cars and trucks in the United States and Canada during May was 338,307 vehicles, according to figures reported today at the Members' Meeting of the N.A.C.C. This represents a decline of 4 per cent under May of last year and also 4 per cent under April of this year, but corresponds with the decrease during May of last year of 9 per cent under the previous month.

ROBERT T. LONGWAY, v.p. and asst. g.m. of Buick, has been named president of the General Motors Institute of Technology . . . E. R. Stettinius, G. M.'s newest v.p., and H. H. Curtice, pres. of A. C., and C. F. Dye, G.M. director of employees' relations, have been named to the Board of Regents of G.M. Tech, rah rah * * * Rentschler Field, the new East Hartford, Conn., airport of United Aircraft, was dedicated May 24 * * * as a result of the extended maneuvers of the first Provisional Air Division, F. Trubee Davison, assistant secretary of War for Aeronautics, believes the United States is clearly in first place among the nations so far as the operation of large air units is concerned * * * the Lees-Brossy non-refueling sustained flight record is regarded in N. Y. as a tribute to the late Captain L. M. Woolson, of Packard, who was killed while flying in a Diesel-engined plane * * * W. Ledyard Mitchell, chairman of Chrysler Export, returns from Europe this week * * * Irene Franklin, the stagestar, has bought a new Hupmobile * * * traveling (amateur) troubadours on buses and other conveyances in England, are gagged under a new ordinance designed for the comfort of the alsoriders * * * about 600 automobiles participated, in Italy, in a "race" controlled from Rome by radio . . . directions for proceeding were broadcast at intervals, which were filled with dulcet Italian music . . . speed was no object, being limited to 35-45 kilometers an hour . . . money and art prizes were distributed to Italian and foreign contestants who followed the radioed directions best * * * there is no difference in principle between selling gasoline on Sundays and greasing an automobile on Sundays, according to a learned judge in Regina, Sask. . . . dismissing a charge against a service station operator * * * Peter De Paolo has definitely retired from racing, according to an announcement on the eve of the Indianapolis race last week * * * Earl Cooper has suggested to the Indianapolis management that new and untried racing cars should be tooled around the big track by an official test driver, to determine whether they have the goods to stand up under a 500-mile go-go * * * On June 20, the town of Placerville, Cal. (formerly called Hangtown), will celebrate Studebaker Day, in honor of John Studebaker, one of the founders of the Studebaker Corp., who 78 yrs. ago first set foot in the settlement . . . Henry and Clem Studebaker, be it remembered, stayed home in South Bend and blacksmithed the local nags . . . after a time in Hangtown, John came home with $8,000 in nuggets and dust from the goldfields . . . the wagon business looked like a nice safe change, and into it went the $8,000, and now the company is worth about $80,000,000 . . . Nice going, what$$$$$$

Compiled, with interpolations by Herbert Hosking.

THE NEWS TRAILER

Macauley Sees New Demand for Novelty

Says Post-Depression Market Will Need It

NEW YORK, June 5—"It is my belief that when we come out of this depression the demand will be, more than ever, for products that show a marked departure from the conventionalities of the past," Alvan Macauley, president of the National Automobile Chamber of Commerce, was to say in his address before the annual meeting of the chamber today.

"I point to the dangerous tendency that we have been facing, of having the automobile lapse into the class of general utilities, like typewriters, adding machines, lawn mowers, or what not."

After reviewing some of the tendencies in the past year of the automobile industry Mr. Macauley was to say:

"The trading of used cars is on a deplorable basis. It is my belief that in 90 per cent of all sales made, the used cars are taken in at a figure that makes it impossible for the distributor or dealer to sell them without a substantial loss.

"The practice of buying business has spread to alarming proportions. It is no longer a question of the merits of the product only. All sorts of pressure and all sorts of inducements are common.

"The focus of the infection is the used car, and the artificial evaluations placed upon it. I know something of the difficulties involved, and I well know the pressure under which all automobile people are laboring. My plea is that in these difficult times we take a look into the future and prepare ourselves to come out of the depression without our foundations being undermined, and ready and able to realize the most improved business conditions."

Mr. Macauley's address was followed by others.

Canadian Tariff Hits Again at Automobiles; Entry of Used Cars for Sale is Prohibited

OTTAWA, June 1—Automobiles were hit in the Canadian tariff increases announced today by Premier Richard B. Bennett, in his annual budget speech to the House of Commons. Many of the schedules affect products manufactured in the United States and imported into the Dominion in large quantities.

Entry of used automobiles is prohibited unless as settlers' effects or as travelers' vehicles.

The revisions include particularly automobiles, coal, coke, food and utility products delivered in cartons; live hogs, fresh meats, bacons, hams and shoulders; canned fruits and vegetables, raisins and oranges, as well as numerous other foods and food products.

The tariff against the United States will be supplemented by subsidies for the coal industry in the Maritime Provinces and Western Canada to the extent of $1,800,000.

The tariff changes are noticeable as against imports from the United States.

In the automobile group the schedules set up three groups for duty purposes.

Cars valued up to $1,200, from $1,201 to $2,100 and above $2,100.

No change in the duty on the first classification is made, but on the second group the general tariff is raised from 27½ per cent to 30 per cent, and on the third, the intermediate and general rates are increased to 30 and 40 per cent, respectively.

Automobiles in the third classification no longer will be privileged to a drawback of duty for home consumption. Drawback on the two lower priced groups will not be paid on a specified list of made-in-Canada parts.

The revisions, the Premier said, were not general, but were confined to such schedules as would assist in adjusting unemployment. Only those items which required to be changed, he said, had been dealt with.

Almost all schedules were affected, however, in regard to certain of their items, the total number of rate-bearing items cited in the resolutions offered being nearly 200.

Excepting in a few instances, alteration in rates is confined to the intermediate and general tariffs, the latter affecting imports from the United States, while British preference tariffs were little altered.

The Premier announced a number of measures destined to make up the $75,244,973 deficit in the budget. These measures included: 1. A special excise tax of 1 per cent on imported goods. 2. An increase in income tax of 8 to 10 per cent. 3. An increase in sales tax from 1 to 4 per cent. 4. An increase in postage rates on letters from 2 to 3 cents.

Canada's tariff schedules provide three rates, British preference, intermediate and general.

The British preference, primarily to give a preference to Great Britain, applies now to practically the entire empire.

The intermediate tariff applies to the nations of the world with which Canada has special trade agreements, and the general applies to other foreign nations.

The general rates apply in the case of the United States.

U. K. Curtails Aero Plans

PHILADELPHIA, June 2—The British Government, as a result of the R-101 disaster, has decided not to continue with the airship program laid down in 1924; it will undertake no new construction, but it will preserve the Cardington airship works as a nucleus, maintain the airship bases at Ismailia (Egypt) and Karachi (India), and keep the R-100 in flying condition for experimental purposes. This policy, it is stated, will involve an expenditure of £120,000 for the first year and £140,000 for the third year.

Diesel Plane Sets Record

JACKSONVILLE, June 1—The world's record for sustained flight without refueling was brought back to the United States last week when Walter Lees and Frederick Brossy, pilots, brought their Packard-Diesel powered Bellanca monoplane to the Jacksonville Beach for a landing at 7.20 p. m. Eastern Standard Time on May 25.

The record, subject to confirmation by the National Aeronautic Association and the Federation Aeronautique Internationale, was set at 84 hr. 33 min., which is 9 hr. 10 min. more than the former record of 75 hr. 23 min., set by pilots Bossoutrot and Rossi in a Hispano-Suiza powered Bleriot, in the period ending April 6, 1931. The last record was established in Algeria.

The plane used by Messrs. Less and Brossy carried 398 gal. of fuel oil. An earlier attempt for the record by the same pilots had been defeated by a sudden storm.

Materials' Index Drops

NEW YORK, June 2—The index of automotive raw material prices, as in effect at the middle of May, compiled by Ray B. Prescott for *Automotive Industries*, registered a decline of one point to 96, after a slight upturn apparent during previous months. In May, 1930, the index figure stood at 111. The Bradstreet index of raw material prices for the month of May, 1931, stood at 98, for a general commodity list.

Farm Machinery Output Declines

Some 1930 Items Increased; Tractors Holding Up Well

WASHINGTON, June 4—Despite the fact that the production of farm equipment and related products decreased to $505,816,296 in 1930 from $607,063,605 in 1929, according to the Bureau of the Census, increases were made in a number of items, including one-bottom and four-bottom and larger tractor moldboard plows; four-disk tractor plows and tractor-drawn cultivators. The total value of tractors produced in 1930 was $205,657,133, as compared with $227,632,527 in 1929 and $191,978,126 in 1928. Of the 1930 production of tractors, $133,054,559 was for use in the United States and $57,481,157 for export.

The 1930 production of tractor-drawn moldboard plows follows:

	No. Establishments	No. Made	Value
1-bottom	13	8,077	$226,990
2-bottom	17	58,408	3,933,290
3-bottom	13	22,268	2,412,593
4-bottom	10	15,198	2,348,396
5-bottom	6	3,720	765,717

The output of four-disk tractor plows by 10 reporting plants totaled 2307, valued at $362,087, while the production of five-disk and larger tractor plows in 10 plants totaled 5309, valued at $1,101,948. The production of tractor-drawn middle-buster listers in 10 plants totaled 18,559, valued at $1,588,596. Tractor-drawn disk harrows in 27 plants totaled 51,969, valued at $4,615,055. Tractor-drawn grain drills in seven plants totaled 12,663, valued at $2,203,522, and tractor-drawn cultivators in 14 plants totaled 56,250, valued at $3,868,967.

The output of wheeled-type tractors in 26 plants totaled 176,075, valued at $123,291,346; of the tracklaying type, produced in 11 plants, 20,222, valued at $48,242,010, and of garden tractors, produced in 13 plants, 6161, valued at $1,102,060. Farm trucks to the number of 39,746, valued at $1,584,637, were produced in 35 plants.

Internal combustion engines to the number of 92,948 for farm equipment were valued at $5,337,512. Of the total 81,746, produced in 24 plants, with a value of $3,874,429, were less than 5-hp.; 9896, produced in 23 plants, with a value of $1,147,813, were 5-hp. or more, but less than 10-hp., and 1306, produced in nine plants, with a value of $315,270, were 10-hp. or more.

Two Companies Merge

DETROIT, June 1—Merger of the Detroit Gasket Co., Detroit, and Crown Cork and Seal Co., Baltimore, was effected last week on a basis of two shares of Detroit Gasket stock for one share of Crown Cork and Seal. Operations of the two units will continue as formerly.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, June 1—Retail trade last week was stimulated by the warm weather and a continuation of seasonal temperatures should aid the movement of summer goods, especially since prices in many lines are low. Wholesale and jobbing trade continued quiet last week. The Federal Reserve Board's summary of business conditions, issued May 24, reported little change in industrial production and factory employment during April.

DEPT. STORE TRADE

Department store trade in the New York Federal Reserve district during April was 8 per cent below that a year ago. Some of this decline resulted from the fact that April sales this year included a smaller part of the Easter business. Store chain sales during April declined 3 per cent below those a year ago.

CONSTRUCTION AWARDS

Average daily construction contracts awarded in 37 Eastern States from May 1 through May 22, according to the F. W. Dodge Corp., amounted to $12,086,800, as against $12,958,700 for April, and $17,592,900 a year ago.

RETAIL FOOD PRICES

Retail food prices in 51 cities on April 15, according to the Department of Labor, averaged 2 per cent below those a month earlier, and 18 per cent below those a year earlier.

FARM PRICE RATIO

The ratio of prices received by farmers for their products to prices paid by them for general commodities on April 15, according to the Department of Agriculture, was 68 per cent of the pre-war ratio, as against 67 per cent a month earlier and 85 per cent a year ago.

CAR LOADINGS

Railway freight loadings during the week ended May 16 totaled 747,732 cars, which marks an increase of 283 cars above those during the preceding week, but a decrease of 181,027 cars below those a year ago, and a decrease of 298,862 cars below those two years ago.

CRUDE OIL OUTPUT

Average daily crude oil production for the week ended May 23 amounted to 2,437,150 bbl., as against 2,426,800 bbl. for the preceding week and 2,597,000 bbl. a year ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended May 30 stood at 70.3, as against 71.0 the week before, and 71.8 two weeks before.

STOCK MARKET

The stock market last week suffered further depreciation in values, which in some cases was large. The unsatisfactory income reports of many railroads for April served as a very depressing influence. United States Steel common stock reached the lowest level since 1924. The volume of trading was moderate.

BROKERS' LOANS

Brokers' loans in New York City during the week ended May 27 decreased $57,000,000, making a total contraction for the last six weeks of $218,000,000.

RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended May 27 showed an increase of $4,000,000 in holdings of discounted bills, while there were decreases of $6,000,000 in holdings of bills bought in the open market, and of $1,000,000 in holdings of government securities. The reserve ratio on May 27 was 85.3 per cent, as against 84.9 per cent a week earlier, and 84.5 per cent two weeks earlier.

Gasoline Consumption in 47 States Increased 2.6 Per Cent in March

NEW YORK, June 1—Gasoline consumption in 47 states and the District of Columbia for the month of March, 1931, as indicated by reports made by wholesalers and dealers in various states under provisions of the gasoline tax laws or gasoline inspection laws, totaled 1,066,186,000 gal. compared with 1,039,390,000 gal. in March, 1930, an increase of 26,796,000 gal. or 2.6 per cent, according to the American Petroleum Institute. Daily average consumption for March, 1931, was 34,393,000 gal., compared with a daily average of 33,326,000 gal. in February, 1931, an increase in daily average during March of 3.2 per cent.

Gasoline consumption in 47 states and the District of Columbia for the three months ending with March, 1931, amounted to 3,003,545,000 gal., compared with 2,843,311,000 gal. for the corresponding period of 1930, an increase of 160,234,000 gal., or 5.6 per cent increase in daily average consumption, it is estimated by the Institute.

Gasoline Consumption by States

	Tax Per Gallon Cents	Month of Feb., 1931 Gallons	Month of Mar., 1931 Gallons	Month of Mar., 1930 Gallons	3 Months Ending With Mar., 1931 Gallons	3 Months Ending With Mar., 1930 Gallons
Alabama	4	11,501,000	12,979,000	14,128,000	37,055,000	40,422,000
Arizona	5	5,356,000	6,355,000	6,393,000	17,561,000	18,583,000
Arkansas	6	10,122,000	8,511,000	9,684,000	30,385,000	29,882,000
Colorado	4	11,488,000	12,434,000	12,821,000	35,959,000	33,142,000
Connecticut	2	12,405,000	15,020,000	16,456,000	41,066,000	42,277,000
Delaware	3	2,642,000	2,726,000	2,801,000	7,626,000	6,950,000
D. of C.	2	6,046,000	6,994,000	6,069,000	19,529,000	16,637,000
Florida	6	21,261,000	22,278,000	22,724,000	65,760,000	66,669,000
Georgia	6	15,772,000	17,106,000	17,601,000	49,971,000	51,725,000
Idaho	5	2,907,000	3,886,000	3,702,000	9,736,000	9,474,000
Illinois	3	68,461,000	68,772,000	70,176,000	202,842,000	185,197,000
Indiana	4	29,697,000	32,604,000	(b)35,984,000	94,277,000	(b)90,144,000
Iowa	3	26,403,000	33,609,000	23,551,000	87,826,000	71,912,000
Kansas	3	24,559,000	25,441,000	30,999,000	76,815,000	78,113,000
Kentucky	5	11,088,000	12,037,000	12,394,000	35,521,000	32,631,000
Louisiana	5	13,101,000	14,064,000	15,167,000	41,012,000	42,556,000
Maine	4	3,849,000	4,808,000	4,610,000	13,098,000	11,461,000
Maryland	4	11,650,000	13,464,000	13,392,000	37,451,000	34,965,000
Massachusetts	2	29,952,000	36,737,000	36,234,000	99,690,000	96,433,000
Michigan	3	46,269,000	53,446,000	56,490,000	152,359,000	150,679,000
Minnesota	3	24,701,000	29,034,000	27,336,000	82,004,000	70,716,000
Mississippi	5	(a)9,200,000	(a)10,383,000	8,990,000	(a)29,643,000	29,123,000
Missouri	2	31,053,000	32,540,000	35,072,000	97,604,000	90,157,000
Montana	5	4,092,000	5,639,000	3,481,000	13,890,000	8,992,000
Nebraska	4	17,695,000	17,307,000	19,009,000	51,336,000	49,490,000
Nevada	4	1,119,000	1,402,000	1,179,000	4,211,000	3,157,000
New Hampshire	4	2,787,000	3,310,000	3,219,000	9,056,000	8,584,000
New Jersey	3	35,134,000	40,827,000	39,841,000	112,774,000	105,105,000
New Mexico	5	3,422,000	3,797,000	3,949,000	10,813,000	11,024,000
New York	2	91,404,000	108,802,000	104,205,000	299,152,000	281,857,000
North Carolina	5	18,564,000	17,393,000	18,484,000	56,002,000	60,542,000
North Dakota	3	4,977,000	7,250,000	6,074,000	18,525,000	12,674,000
Ohio	4	66,749,000	69,168,000	74,173,000	199,288,000	196,700,000
Oklahoma	4	22,605,000	24,277,000	27,015,000	70,330,000	68,800,000
Oregon	4	10,961,000	12,631,000	13,465,000	33,882,000	30,119,000
Pennsylvania	3	61,407,000	73,009,000	51,860,000	215,633,000	204,100,000
Rhode Island	2	5,227,000	7,182,000	6,605,000	18,397,000	16,925,000
South Carolina	6	8,489,000	9,741,000	9,605,000	27,217,000	26,758,000
South Dakota	4	7,634,000	12,793,000	9,766,000	29,333,000	25,259,000
Tennessee	5	14,007,000	15,842,000	15,574,000	44,885,000	43,264,000
Texas	4	54,653,000	62,513,000	65,666,000	178,225,000	176,313,000
Utah	3½	3,526,000	4,566,000	4,126,000	11,842,000	11,349,000
Vermont	4	1,804,000	2,139,000	2,114,000	6,067,000	5,604,000
Virginia	5	14,443,000	16,268,000	16,654,000	46,369,000	44,369,000
Washington	3	17,235,000	29,214,000	21,448,000	62,880,000	51,560,000
West Virginia	4	7,800,000	8,283,000	8,842,000	24,111,000	22,944,000
Wisconsin	2	25,718,000	35,148,000	27,955,000	87,745,000	72,328,000
Wyoming	4	2,192,000	2,457,000	2,307,000	6,792,000	5,646,000
Total		933,127,000	1,066,186,000	1,039,390,000	3,003,545,000	2,843,311,000
Daily Average		33,326,000	34,393,000	33,529,000	33,373,000	31,592,000
Increase over previous year:						
Amount of Increase		.....	26,796,000	.....	160,234,000	.....
Percentage Increase in Daily Average		.....	2.6%	.....	5.6%	.....

(a) Estimated. (b) Revised.

		Quarter Ending December 31, 1930	Quarter Ending March 31, 1931	Quarter Ending March 31, 1930
California	3	336,140,000	335,802,000	294,482,000
Pennsylvania	3	267,573,000	215,633,000	204,100,000

Consumption of gasoline in Pennsylvania, by months, during 1930, follow:

January ..96,915,000	April 57,282,000	July 85,144,000	October ..91,702,000
February .55,325,000	May 67,184,000	August ...81,574,000	November 83,063,000
March ...51,860,000	June 82,020,000	September 83,965,000	December.92,808,000
	Total 1930 928,842,000		

Continental Adding Lines

DETROIT, June 1—The regular quarterly meeting of the field sales engineers of the Continental Motors Corp. closed May 29, at the Corporation offices in Detroit. L. J. Kanitz, general sales manager, told the field men that the present engineering department of the Corporation has completed the development and tests of a number of new models of the Red Seal engine which will soon be introduced to the market and which will cover an even wider range of power applications than the present line.

Chevrolet Begins Demonstrations

Aims to Give A Million Rides During June

DETROIT, June 6—A national demonstration campaign, with a goal of one million demonstrations during the month, has been mapped out for June by the Chevrolet Motor Co.

The campaign is in line with Chevrolet's previously expressed opinion that the potential buying capacity of the country is unimpaired and requires only intensive sales effort to develop a satisfactory volume, according to H. J. Klingler, vice-president and general sales manager.

During the month of June, every one of the 35,000 Chevrolet dealers, sales managers and salesmen will be required to fill an assigned quota of demonstrations, appraisals and sales.

The campaign is arranged so that the objective is directly aimed at increased demonstrations, and that special recognition will be given salesmen who fill their demonstration quota.

During the month the campaign will be strongly supported by dealer window displays, campaign buttons, windshield stickers, special advertising literature and other factory assistance.

General Tire Co. Cited

NEW YORK, June 1—General Tire and Rubber Co. is one of five industrial concerns selected by President Hoover's Emergency Committee for Employment as examples of what can be done for relief of unemployment and loans for workers.

Other companies are the International Harvester Co., General Electric Co., Southern Pacific Co., and the Mathews Construction Co. of Princeton, N. J.

The General Tire Co.'s plan involved the declaration of an extra dividend to be divided into two parts —the first half going to stockholders and the second to a fund to stimulate buying in off seasons so that plant operations could be regularized throughout the year and employment stabilized. Should this plan fail, loans will be made to unemployed regular workers up to five days' wages a week.

Binks Plans Issue

CHICAGO, June 2—At a special meeting of class A and class B stockholders of Binks Manufacturing Co. yesterday, directors were authorized to sell $300,000 of five-year 6½ per cent debentures and to issue 20,000 shares of class B common stock. These shares would increase the authorized class B stock to 140,000. There are 60,000 shares of class B stock held in reserve for possible conversion into A stock. The funds will be used to increase working capital and liquidate current debt.

Ford Produces 102,095

DETROIT, June 2—World production of Ford cars and trucks in May totaled 102,095 units. With the exception of the April production total of 117,891 cars and trucks, May production was the highest since July, 1930.

Auburn Pace Continues

AUBURN, IND., June 1—Shipments of 6717 Auburn and Cord cars for May were announced today by R. H. Faulkner, president of the Auburn Automobile Co. This is an increase of 714 cars over April, the all-time record month for the company.

Shipments for the first five calendar months of 1931 total 24,438, making 10,745 more cars than during the entire year of 1930.

At the same time Mr. Faulkner announced that 193 new dealers had been added in May. Reports from the country-wide dealer organization, Faulkner said, show that they have only an average of two and one-third cars in stock.

Plan Foote-Dodge Merger

CHICAGO, June 1—Plans for consolidation of Foote Bros. Gear and Machine Co., Chicago and Dodge Mfg. Corp. of Mishawaka, Ind., and Oneida, N. Y., were disclosed last night in letters to stockholders following approval of the merger by directors of both concerns.

Consolidation would be effected through an exchange of stock and the assumption of liabilities of both companies, requiring no public financing. The new company would be known as the Dodge-Foote Corp. and would be the largest unit in the world engaged in the manufacture of machinery for the mechanical transmission of power, the letter states.

Plans call for the transfer of the gear manufacturing business of Foote Bros. to the Dodge plant at Mishawaka.

Graham Produces 4005

DETROIT, June 2—Graham-Paige Motors Corp. has announced that May production amounted to 4005 units, as compared with 2554 in April and 4797 in May, 1930.

Michigan Sales Gained in April

But Were 32 Per Cent Below Total For April, 1930

DETROIT, June 2—Automobile registrations in the State of Michigan during April totaled 14,166, an increase of 3408 or 26 per cent over the total of 10,758 in March, and a decrease of 6788 or 32 per cent from the April, 1930, total of 20,954.

Ford with 4713 showed an increase of 702 or 14 per cent over the March figure, but a decrease of 5810 or 55 per cent from the April, 1930, total.

Chevrolet April registrations totaled 4210, which was 32 per cent ahead of the March figure and almost equaled the April, 1930, figure of 4341.

Pontiac was third on the list with 686, Buick fourth with 666, Oldsmobile fifth with 612 and Essex sixth with 546.

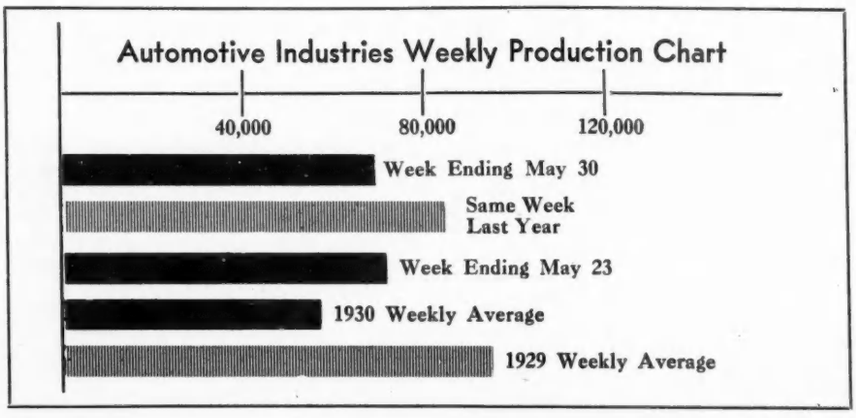
April commercial car registrations totaled 1291, a gain of 18 per cent over the March figure of 1053 and a decrease of 21 per cent from the April, 1930, total of 1968. Ford was first with 755, Chevrolet second with 333 and International third with 49.

Rubber Shipments Gain

NEW YORK, June 2—Shipments of crude rubber from Malaya during May totaled 44,281 tons, as compared with 43,453 in April. Shipments from Ceylon during the month were 4535 tons, as compared with 3487 in April. Partly compensating for the increased exports was a decline of 581 tons in stocks in the United Kingdom last week, according to the Rubber Exchange of New York.

Expect Sharp June Drop

DETROIT, June 3—The majority of sales executives contacted here predict more than seasonal decline for June sales. The average estimate places total domestic sales for the year now at 2,100,000 passenger cars with total vehicles, including Canada and export, at around 2,900,000.



Truck Shippers Oppose Rails

File Brief With I. C. C. Pointing Out Benefits of Unregulated Movement

(Continued from page 887)

4. That in support of the Federal highway system, the greatest reciprocity between states should be required in the encouragement of the freest movement of truck transportation in interstate commerce.

Declaring that the Bureau of Public Roads, Department of Agriculture, is the only agency having a background with a full knowledge of the public need for highway transportation, the brief says that to set up regulation in the Interstate Commerce Commission to adequately police and make it effective over interstate highway transportation would require a personnel and appropriations far in excess of that now required for regulation of the comparatively small number operating railroads.

It is stated that if relief is necessary to the rail carriers, it should be given by a plan of regulation, with such changes in the law as may be necessary, forcing the carriers to substitute greater individual initiative and action for the present associated, fixed policy and group action by the railroads of various territories. Coordination, it is declared, can be brought about only by joint action in open, sincere dealing and planning by the mediums to be coordinated, the railroad and the highway.

Fan Noise

Those who have been interested in the article on Tuning Fan Noises to Engine Noise in the May 23 issue of *Automotive Industries*, will be pleased to know that A. D. Gardner, chief engineer of the Automotive Fan & Bearing Co., will present a much amplified discussion of this subject in the forenoon session, Friday, June 19, at the summer meeting of the Society of Automotive Engineers.

The attention already drawn to this subject indicates that further discussion will have widespread interest among engineers.

Auto-Lite Declares

TOLEDO, June 3—Electric Auto-Lite Co. has declared its regular quarterly dividends of $1.50 on common and $1.75 on preferred stock payable July 1 to holders of record, June 15, at its meeting today.

Hupp Ships 2154

DETROIT, June 2—Hupp Motor Car Corp. reports shipments of 2154 cars during May, as compared with 3139 in April and 3348 in May last year.

Financial Notes

National Standard Co. has reported net income for the seven months ended April 30, 1931, the first seven months of the firm's fiscal year, was $325,014, after all charges, including Federal taxes. This is equal to $2.21 a share on 146,536 shares of stock outstanding and compares with $283,008, or $1.89 a share on 150,000 shares of stock outstanding for the seven months ended April 30, 1930. Net earnings for April, 1931, were $75,473, an increase of $9,277 over the corresponding month a year earlier. Tonnage shipments in May were the largest for any similar period in the history of the company. Directors declared the regular dividend of 75 cents a share.

Curtis Mfg. Co. stock has been placed on an annual dividend basis of $1 a share with declaration of a quarterly distribution of 25 cents a share. This compares with the annual rate of $2.50 a share heretofore. The dividend is payable July 1 to stockholders of record June 15. The company's fiscal year, ended May 31, last, and the financial statement will not be made public for some time, although several weeks ago, Walter C. Hecker, president of the company, estimated earnings at something in excess of $1.50 a share on the 200,000 shares of $5 par capital stock outstanding. Earnings of this amount would compare with $3.62 a share in the preceding fiscal year.

Perfect Circle Co., Hagerstown, Ind., has declared the second quarterly dividend for 1931 of 50 cents a share on the 162,500 shares of common stock outstanding. Stockholders of June 20 are eligible for the dividend, payable July 1.

L. A. Young Spring & Wire Co. has declared regular quarterly dividend of 75 cents, payable July 1 to stock of record June 15.

Vesta-Consolidated Merge

CHICAGO, June 4—A merger was effected on June 1 between the Vesta Battery Corp., Chicago, and Consolidated Battery Co., whose main office is located in Philadelphia with factory in Buffalo. The former is one of the oldest battery manufacturers, having been established in 1897. The name of the combined companies is Vesta Consolidated Corp., with office at 6501 West Sixty-fifth Street, Chicago.

Auburn Declares

AUBURN, June 4—Auburn Automobile Co. announced today declaration of its regular dividend of $1 a share cash and the usual additional dividend of 2 per cent, payable in stock. The dividend voted is payable July 1 to stockholders of record at the close of business June 20.

Mrs. C. O. Miniger

TOLEDO, June 3—Many executives of automotive concerns attended the funeral services here Monday of Mrs. Eleanor C. Miniger, wife of C. O. Miniger, president of the Electric Auto-Lite Co., who died early Saturday after an illness of several months.

Oakland Produces 14,829

DETROIT, June 3—Oakland May production was 14,829 cars compared with 11,972 last May and 14,188 in April which was the biggest month since August, 1929.

Arthur C. Mason Dies in Flint

One-time Vice-President of Chevrolet; Organized Own Companies Twice

FLINT, June 2—Arthur C. Mason, 62 years old, one of the pioneers of the automotive industry and one-time vice-president of the Chevrolet Motor Co., died in a hospital here May 27 from concussion of the brain.

Born in Toronto, Ont., March 30, 1869, Arthur Mason spent his early life in Canada. He was a machinist and tool designer until 1903 when he came to Flint to become superintendent of the first motor plant of the Buick Motor Co. He was with that concern eight years, being assistant general factory superintendent when he resigned and organized the Mason Motor Co., which made automobile motors for the general trade. He was later made a vice-president of the Chevrolet Motor Co., being with that concern until several years after it was consolidated with the General Motors corporation. He later organized the Mason Truck Co., which discontinued manufacture of its products several years ago. Later he went to California and was one of the developers of the Sierra Aircraft Corp. He returned to Flint a few years ago and was at the time of his death plant manager of the A. G. Redmond company, manufacturers of sheet metal products and electric motors.

During the early days of the automotive industry he was an associate of W. C. Durant and C. W. Nash. He was a member of the Society of Automotive Engineers.

M. E. A. Adopts New Credit Policy

NEW YORK, June 4—A policy of permitting non-members of the association to participate in the credit activities, on an associate membership basis, has been adopted by the Motor and Equipment Association, according to an announcement made today. Considerable widening of the credit facilities of the organization is expected as a result.

Duesenberg Show Draws

INDIANAPOLIS, June 4—More than 35,000 people attended the land, air and water transportation exhibit held here from May 27 to June 3 at the Duesenberg factory.

Caterpillar Prices Cut

CHICAGO, June 3—Caterpillar Tractor Co. has reduced prices on four models ranging in price from $475 to $1,735.

Electric Railways Ask Regulation of Trucks in Brief to Commission

WASHINGTON, June 2—The electric railroads contend that the present economics of motor transportation is unsound and destructive, and in a brief filed by the American Electric Railway Association tell the Interstate Commerce Commission that if motor transportation is placed on a proper "economic foundation" and the electric lines are unable to compete, the latter must give way.

Like the steam carriers have done in the motor-rail coordination proceedings, the electric lines urge regulation of motor bus and truck operation on the public highways.

The electric railroads asked that motor lines be required, in addition to paying gasoline and license taxes, to pay "any excess of road construction costs due solely to use by heavy vehicles; any excess of road maintenance charges, on account of the use of heavy vehicles; any governmental expenses incurred solely on account of such carriers; all costs caused by protecting customers and the public against injuries and property damage on account of their operation.

The Southern Pacific Co. urged amendment to the Interstate Commerce act to provide store-door pickup and delivery of less-than-carload freight by railroads through contracts with trucking companies. It was also recommended that the amendment provide that "no express company engaged in such store-door pickup and delivery of freight shall extend its service beyond the territory to be specified in its tariffs served by the common carriers over which it may operate, or beyond reasonable zones to be specified in its tariffs surrounding the stations or terminals of such common carrier, without a certificate of public convenience and necessity from the Commission."

It was suggested that the term "express company" shall include any common carrier using the services, etc., of another common carrier. The Southern Pacific brief also asked that express companies provide in their tariffs for the store-door pickup and delivery of freight in the territory served by the common carriers over which they may operate.

Brockway Reduces Directorate

NEW YORK, June 1—Brockway Motor Truck Corp., at stockholders' meeting, reduced its board of directors from 11 to nine. George A. Brockway, R. F. Black, C. M. Finney and J. Gossner were reelected directors. New directors elected were A. E. Brewer, A. J. Buck, Walter A. Ford, F. R. Thompson and W. H. Webster.

The directors elected the following officers: G. A. Brockway, chairman; R. F. Black, president; C. M. Finney, vice-president and treasurer; J. Gossner, vice-president in charge of export; George Piroomoff, vice-president in charge of engineering; C. E. O'Neill, secretary and assistant treasurer. Messrs. Brockway, Black and Finney were elected members of the executive committee.

McDarby Visits Phila.

PHILADELPHIA, June 2 — Neil E. McDarby, vice-president in charge of sales of the Auburn Automobile Co., arrived at the Camden Airport today in a new Stinson airplane, purchased by the company for the use of executives. It was piloted by Capt. Edward A. Stinson, president of the Stinson Aircraft Corp.

This was the first leg of a tour of distribution points being made by Mr. McDarby to hold dealer meetings.

Wisconsin Restricts Trucks

MADISON, WIS., June 1—Gov. La-Follette has signed a bill which prohibits trucks from entering Wisconsin without Wisconsin license plates. The bill was signed despite the arrest of numerous Wisconsin truck drivers by Illinois authorities in the face of protests from Illinois trucking interests. The arrests were said to have been in reprisal, and an effort was made to return the bill from the governor for amendment. Out of state commercial vehicles must now pay a full license fee in addition to a ton mile tax. From Springfield, Ill., came word that the state department would continue to authorize arrest of drivers of Wisconsin trucks without Illinois plates.

New Zealand Ends Canada Preference

WELLINGTON, N. Z., June 2—New Zealand decreed that practically all Canadian imports shall be deprived of the advantage of the British preferential tariff and shall be placed on the general tariff, although no alterations are proposed in respect to Canadian motor vehicles and engines, the duties of which were increased last August, it was announced yesterday.

The decision will hit the motor car, parts and tire industries in Canada, according to importers here.

Training Road Builders

NEW YORK, June 1—Engineers and highway superintendents in Pan-American countries are being trained in road-building methods through a scholarship plan supported by the American Road Builders Association.

Two road builders from each of 15 Pan-American countries will be appointed in 1931 for six months' study of American highway methods and equipment.

Motor Stocks Decline in May

New York Listings Dropped 17 Per Cent In Valuation in Month

NEW YORK, June 1—Securities of seven representative automotive concerns declined in stock valuation 17 per cent during May, according to Frazier Jelke & Co., New York bankers. This decline contributed to a general decline of 14.2 per cent in the stocks of 100 chosen from the various representative stocks.

Stocks showing a greater decline than motors were mines, 27.9 per cent; steels, 21.7 per cent; rails, 20.8 per cent; equipments, 18.1 per cent. Amusements showed the same decline as motors; miscellaneous industrials declined 16.2 per cent; chemicals, 14.8 per cent; utilities, 12 per cent; electrical equipment, 11.4 per cent; foods, 10.9 per cent; oils, 3.4 per cent.

The hundred stocks chosen in this table have shown a decline of approximately 60 per cent since August, 1929.

Feiker Heads Bureau

WASHINGTON, June 2—Frederick M. Feiker, New York, formerly managing director of the Associated Business Papers, Inc., of which *Automotive Industries* is a member, has been appointed director of the Bureau of Foreign and Domestic Commerce, Department of Commerce, by President Hoover.

He succeeds William L. Cooper, who desires to resume his post as commercial attache in London.

In 1921, during the height of an active career in the technical publishing field, Mr. Feiker was appointed assistant to the Secretary of Commerce. As a government official and trade association executive he was active in the Census of Distribution, the Louisville Conference on Retail Distribution and other programs of this nature.

Franklin Plant Closed

NEW YORK, June 1—H. H. Franklin Manufacturing Co., Syracuse, has discontinued production for a two-week period, beginning May 31 and ending June 15.

The company officials state that this is for the purpose of adjusting output to seasonal demand, and they express the opinion that from now on demand will be on an even keel. Shipments will be continued as usual during the shutdown.

Advance Merger Approved

CHICAGO, June 1—Stockholders of Advance Rumely Corp. Friday approved the proposed merger contract with Allis-Chalmers Mfg. Co. by a 75 per cent majority of shares entitled to vote.

Steel Demand Continues Fair

Prices in Background As Buyer's Market Seems Likely to Go On

NEW YORK, June 4—In contrast with most other steel consuming lines automotive demand continues to make a very fair showing. Some third quarter inquiries have come out in the Detroit district and small tonnages of sheets are reported to have been booked. Finishing mills are prepared for a gradual tapering-off in specifications from now on, but the midsummer dip is looked for to be somewhat less acute than in more normal years.

As though by common consent of buyers and sellers, prices come in for relatively little discussion. Sellers appear for the present to be satisfied with continuing the levels heretofore in vogue and buyers, so long as they are not confronted with advances, place their orders in a routine way. With from week-to-week schedules more or less uncertain, incisive production economies are out of the question, but constant pressure to reduce deficits can hardly be exerted without some effect on per-ton mill costs.

So long as steel is "sold" rather than "bought," as was the case during the market's heyday period, buyers need bring no pressure to bear on prices, competition among sellers being so much more powerful a leveler of prices than any stratagems this or that purchasing agent might resort to. Usually when the sheet and strip steel markets dip too low, mills supplying non-integrated rollers with semi-finished steel administer a tonic by advancing their prices for sheet bars and billets, but the semi-finished market just now is completely under the influence of the flabby sheet and strip markets.

The best that thoughtful steel producers now hope for is that when things generally take a turn for the better, steel prices will be one of the leaders in this recovery.

Pig Iron—The market is quiet and easy, the Valley market for foundry iron being quoted at $16, furnace. Lake furnaces quote foundry and malleable for Michigan shipment at $17.

Aluminum—Slightly less demand from automotive foundries is noted. Prices are unchanged and fairly steady.

Copper—The copper market opened the week nominally unchanged at 8½ cents, delivered Connecticut, and 8⅝ cents, delivered Middle West. It is rumored that the conferences between domestic and foreign producers were adjourned without any definite understanding as to world market policies having been reached.

Tin—End of May statistics showed an increase by 2769 tons to 51,231 tons in the world's supply. The market eased off in consequence, the week's opening price for spot Straits being 22.40 cents.

Lead—Quiet and unchanged.

Zinc—The Joplin ore market is $1 per ton higher and the tone of the zinc market a shade firmer.

Lincoln Adds Phaeton

DETROIT, June 3—A sport phaeton has been developed on the Lincoln 145-in. free-wheeling chassis, the Lincoln Motor Co. announces. Two developments of this type have been made, one with, the other without a tonneau cowl. In general lines, the new car is smart in appearance, with a top of new design and new type wind deflector glasses.

Commerce Survey Enlarged, Revised

WASHINGTON, June 1—With the June issue of the newly revised "Survey of Current Business," the Department of Commerce makes available more than 2000 separate indicators of business conditions, according to an announcement by W. L. Cooper, who is retiring as director of the Bureau of Foreign and Domestic Commerce to resume duties as commercial attaché in the United States Embassy at London.

The "Survey" was inaugurated in 1921 by President Hoover, then Secretary of Commerce. In the 10 years of its history, it has included in its pages from 500 separate items to the mentioned 2000. Its present size and scope is made possible by the cooperation of editors, publishers, business executives, and other private sources of business information, according to Mr. Cooper's announcement.

Consolidate Airlines

CHICAGO, June 1—Consolidation of management, operation, traffic and sales of four Eastern and Western air lines, flying approximately 12,000,000 miles annually, was announced yesterday by F. B. Rentschler, president of the United Aircraft & Transportation Co. The four transport units will be designated as divisions of United Air Lines and will maintain general offices in Chicago. The air lines involved are: National Air Transport, Boeing Air Transport, Pacific Air Transport and Varney Air Lines. P. G. Johnson, president of the Boeing companies, recently made president of National Air Transport and Varney Air Lines, is to be president of the new company.

Rubber Suspension Used

NEW YORK, June 1—Utilization of rubber bonded to metal by a process developed by the B. F. Goodrich Co. for suspension purposes in automobiles was reported to the American Chemical Society by J. R. Hoover and F. L. Haushalter of the Goodrich company.

In this process rubber is made to adhere to two or more metal plates in the form of a mounting to suspend motors or other vibrating machinery. The advantage claimed for this is that rubber may be used in shear rather than under direct compression.

Truck Executives Plan Meeting

St. Louis Session Will Consider Legislative Questions

NEW YORK, June 2—The fourth national conference of the Truck Association Executives of America will be held at the Jefferson Hotel, St. Louis, June 8 and 9.

The meeting will be presided over by Col. Henry C. Kelting, and greetings will be extended by Byron E. Finley of the Missouri Truckmen's Associations, and by Frank Kirby of the Ohio Association of Commercial Haulers. A report of the Lansing, Michigan, Joint Conference of Automotive State Administrators of Ohio, Michigan, Illinois and Indiana will be given by Arlie Boswell of the Michigan Regulated Motor Freight Carriers' Association. Edward F. Loomis, manager of the Motor Truck Department of the National Automobile Chamber of Commerce, will review that body's National Truck Education Campaign for the past two years and the work of the Motor Vehicle Conference Committee.

During the afternoon of the first day, there will be a discussion of the need for complete national reciprocity, headed by T. A. Horrocks of the Minnesota Truck Owners' Association and contributed to by Joe Hays, counsel for the Iowa Truckers' Association, by Frank Kirby, Col. Kelting and Morris G. Young of the field staff of the Motor Truck Department of the N.A.C.C.

The following morning Tom Snyder, chairman of the board of the Motor Truck Association of Indiana, will discuss consolidated motor truck terminals. Allen W. Church, of the Allen W. Church advertising agency, and Warren E. Wright, of the Central Motor Freight Association of Chicago, will discuss substantial and sustaining incomes for truck association executives.

During the afternoon, there will be a discussion of the motor-rail controversy with proposals for definite activity of state and national scope.

Reo Produces 1737

DETROIT, June 1—Reo Motor Car Co. has reported total May production of 1737 units, with 990 passenger cars and 747 commercial cars. It is also reported that there are three times the number of unfilled orders on hand as at the same time last year.

S.A.E. Plans Two Meetings

NEW YORK, June 2—Society of Automotive Engineers will hold its national production meeting in Detroit, Oct. 7 and 8, and its national transportation meeting in Washington, Nov. 10 to 12.

Men of the Industry and What They Are Doing

Reo Names Arenschield

C. R. Arenschield has been appointed manager of the Reo Sales Corp. of Philadelphia, according to an announcement by Elijah G. Poxson, general sales manager of Reo.

Mr. Arenschield returns to Reo after an absence of several years. He was, for a period of years, associated with Studebaker as manager of various branches.

J. W. Culverhouse has been appointed assistant manager. Mr. Culverhouse has been associated with Reo branch operations for several years.

Curtiss-Wright Names Brown

Curtiss-Wright Airplane Co. has appointed Ray W. Brown sales manager of the Southeastern territory, comprising part of the states of Missouri, Illinois, Mississippi and Arkansas, and the entire states of Tennessee, North and South Carolina, Georgia, Florida and Alabama. Mr. Brown replaces E. C. Sutton, who formerly occupied this position.

Phillips Leaves for Europe

Frank E. Phillips, assistant sales manager of Gemmer Manufacturing Co., has sailed for Europe.

Ford Adds Convertible

DETROIT, June 3—Ford dealers here are announcing the showing of a new convertible Model A sedan with Detroit delivered price of $675.75. The new car resembles the victoria. It has a fabric leather top which is washable. The doors and slightly triangular rear windows have stationary frames, these remaining up when the top is put down. The windshield frames are also stationary, together with roof header-bar over doors. This gives unusually good bracing for the front pillars and cowl, in a convertible model.

Cadillac Ships 1777

DETROIT, June 3—Cadillac-LaSalle shipments for the first five months of this year are 5 per cent ahead of corresponding period last year. May shipments of 1777 brought 1931 total to 9572. This compares with 9052 for five months of 1930. Last year the May shipments aggregated 2219.

Chevrolet Builds 113,852

DETROIT, June 2—Chevrolet built 113,852 cars and trucks in May, according to W. S. Knudsen, president and general manager, which exceeds the total for every month last year, and is the largest single month's output since July, 1929.

The May figure, representing world production, compares with 113,187 last May and with 106,096 in April this year. While the increase over last May is slight, Mr. Knudsen pointed out that dealer stocks of both new and used cars are now in far better shape than a year ago.

During May Chevrolet plants operated at a normal average of five and one-half days a week, and employment went above 36,000 men, the company's normal payroll, Mr. Knudsen said. The May export requirements were nearly five times as heavy as in the corresponding month last year.

Wayne Sales Reported

DETROIT, June 3—Wayne County May registrations totaled 6983, an increase of 15 per cent over April's figure and a decrease of 31 per cent from May of last year. Chevrolet totaled 1800, being 14 per cent over April, and 30 per cent above last May, and increasing 20 per cent over April. Essex was third, Pontiac fourth, Chrysler fifth, in order of cars registered. The following makes show increases over same month year ago: Auburn, Cord, Chevrolet, Chrysler, Cadillac, Dodge, Pontiac, Willys. Commercial registrations totaled 559, compared with 410 in April and 577 last May. Ford is first with 381, Chevrolet second with 100, Dodge third with 21.

Harry W. Bundy

DETROIT, June 3—Harry W. Bundy, founder and chairman of the board of directors of the Bundy Tubing Co., Detroit, died yesterday at his summer home at Beaver Island. He was factory manager, Diamond Manufacturing Co., from 1912 to 1918 and organized the Bundy Tubing Co. in 1922. He is survived by Mrs. Grace Bundy and two daughters.

Young Reports Improvement

RACINE, WIS., June 2—The Young Radiator Co. reports a 20 per cent increase in its business over the rate which has been prevailing for the past three months. Increases in manufacturing schedules have caused the installation of additional equipment and additions to the staff have been made.

Buick Ships 9356

DETROIT, June 2—Buick Motor Company produced and shipped 9356 cars in May, compared with 13,939 in April and 9374 in May, 1930.

Indian Reports Two Months Gain

Company is Now Operating on a Profitable Basis

SPRINGFIELD, MASS., June 2—Reorganization of the Indian Motocycle Co. affairs under the present management has resulted in a marked improvement in the financial condition of the company as indicated by a $46,396 profit for March and April. This compares with a loss of $168,825.64 for the corresponding two months in 1930.

A thorough reorganization of the company's manufacturing, sales and administration affairs has been completed by E. Paul duPont, president. The result has been a checking of the consistent record of losses. The company passed to a profit-making basis in March. The record by months since the beginning of this year is as follows: January, loss, $42,382.75; February, loss, $33,408.75; March, profit, $17,160.75; April, profit, $29,235.98. Net sales during March and April were $591,581.73 compared with $776,952.71 for the same two months last year. Mr. duPont points out that March and April are peak months.

Prospects are reported good for the season and Mr. duPont states that the manufacturing economies have made it possible to make a profit on a smaller volume of business.

Robey Track Opens

CHICAGO, June 2—The speed argument started Memorial Day at Indianapolis speedway was to be continued this Sunday at Robey speedway when the first three place winners of the 500-mile classic were listed among the starters. Lou Schneider, Fred Frame and Ralph Hepburn are to race in the 100-mile A.A.A. contest. The Robey track now operates under A.A.A. contest board sanction. Al C. Faeh, secretary-manager of the Chicago Automobile Trade Association, recently named by Capt. E. V. Rickenbacker to serve as an official in this territory, was to officiate Sunday for the first time.

Illinois Sales Off

CHICAGO, June 2—New car sales in Illinois during May totaled 15,349, compared with 17,004 in April and 23,036 in May, 1930. For the first five months of 1931, new automobile sales were 36,064 cars, as compared with 92,624 in the corresponding period of 1930.

Olds Ships 6025

DETROIT, June 2—Olds Motor Works reports shipments of 6025 cars in May, compared with 7574 in April.

L. G. S. Corp. Doubles Output

Fourteen Makers Try Out Free-Wheeling Device

INDIANAPOLIS, IND., June 1—Additional equipment is being added by the L. G. S. Devices Corp., to double the daily capacity of the plant. The L. G. S. Co. is a division of the Cord Corp.

Present capacity is 1000 spring units daily and the new equipment will bring this up to 2000. The machinery will require from 30 to 50 days for installation.

Fourteen automobile companies now have L. G. S. free-wheeling units in experimental cars on their proving grounds, W. C. Starkey, president of the corporation, has announced.

Mr. Starkey also announced that two automobile companies had already entered contracts for the use of the company's helical spring in engine starter units.

British Aero Exports Gain

PHILADELPHIA, June 1—According to statements made at the dinner of the British Aeronautical Inspection Directorate on May 1, Lord Amulree said exports of British aircraft and aircraft engines are very much greater than they were five years ago, and he gave the following figures for the exports under these heads during each of the past five years: 1926, £827,000; 1927, £845,000; 1928, £961,000; 1929, £1,558,000; 1930, £1,428,000. The figures include aircraft exports to the Dominions and colonies, but not those to India.

Hudson Elects

DETROIT, June 1—Officers of the Hudson Motor Car Co. were reelected at the annual meeting. A dividend of 25 cents a share on the common stock was declared, payable July 1, to stockholders of record, June 11. C. G. Abbott, director of merchandising of the company, was elected a director to succeed J. W. Beaumont, resigned. Max F. Wollering, director of manufacturing, was also elected a corporation director to succeed J. H. Whittaker, who resigned last year.

Stutz Payroll Increases

INDIANAPOLIS, June 1—E. S. Gorrell, president of the Stutz Motor Car Co., has issued a statement that the payroll of the Stutz factory is the largest that it has been this year. Steady increases in both sales and production during 1931 are responsible for the added man-power, it was said.

Slump in World Commodity Prices Held Chief Deterrent to Recovery

NEW YORK, June 1—Although accorded no specific part of the program, and omitted from mention in the final declaration of policy, America's Tariff Act of 1930 received considerable attention as the possible cause of the present world-wide depression at the 18th National Foreign Trade Conference, held at New York last week.

The act was not, however, lacking in able defenders, backed by effective ammunition in the way of statistics. Frequent mention was made that countries of which we have been large customers in the past, have suffered marked losses in their export trade, and have consequently been unable to buy abroad as heavily as they otherwise might have.

Senor Don Manuel E. Malbran, Ambassador to the United States from Argentina, openly accused this country of cutting off the imports to this country of linseed, hides and other Argentinian products upon which the prosperity and buying power of its nationals depend. James A. Farrell, president of the United States Steel Corp., and chairman of the National Foreign Trade Council, under whose auspices this conference was held, also made reference to the deterrent effects of our tariff act on foreign trade in his welcoming address. It kept cropping up in various of the speeches that were made throughout the three-day session which closed on Friday, May 29.

In refutation of criticisms of the act, Dr. Julius Klein, Assistant Secretary of Commerce, in speaking before the Thursday evening dinner session, clearly indicated that this law was not responsible, quoting a number of statistics from our foreign trade with numerous countries to show that our imports of taxed goods from those countries did not decline so heavily during 1930 as did our importations of tax-free goods. Others, too, speaking as economists and bankers rather than active traders themselves, in analyzing our foreign trade conditions, indicated the tariff was not mainly responsible for our falling off in trade during the past year and a half.

Although Latin America is responsible for about 30 per cent of our foreign trade, it received by far the most attention at this meeting of any of the foreign markets. The United States has been the largest customer for most of the products which these countries export, and the loss of a portion of our trade during the past several months has obviously affected their employment situation and their ability to buy our products. Regardless of the justice of their contention, the fact remains that they have been inclined to lay this to our tariff act.

Latin America, too, has been very largely affected by the overexpansion of its foreign credit. All these conditions have created a political unrest which in turn has further retarded their ability to engage in active foreign trade. Most of these countries, however, have shown themselves honest of purpose, and while they may have difficulties in meeting their obligations, there seems to be little question that they will eventually do so. However, there is the further difficulty that present conditions are leading in some of these countries to a depreciating currency which makes it more difficult for our merchants to get their money out for goods sold.

Countries mentioned specifically show varying conditions. Argentina, Chile, Bolivia, Uruguay and Brazil are all having their difficulties in these respects but their commodities are such that with the return of anything like normal business in the rest of the world, they should again be able to stabilize their currencies and ease the situation generally. Peru, on the other hand, whose principal export commodity is silver, will probably have greater difficulty in ironing out its exchange situation with the world increasingly going onto a gold standard for currency.

In this point is touched the crux of the whole situation, in the opinion of many of the speakers of the conference, and as pointed out in the closing statement of policy issued by the conference. Most of the countries of the world depend primarily upon a limited number of commodities to maintain their portion of international trade. In almost all instances, these commodities are now selling throughout the world at prices which do not pay for their productions.

In commodities as in the stock market, nobody buys on a declining market. The result is further declines.

The luncheon session on the last day of the conference, held under the auspices of the Overseas Automotive Club, was of specific automotive interest. R. C. Thompson, export manager of the Prest-O-Lite Storage Battery Sales Corp., speaking on the automotive market in South America, and C. M. Peter, export manager of Black & Decker, speaking on Europe, both looked for considerable improvement in the not-far-distant future.

In South America, there is an increasing realization that as the new and used car sales have decreased during the past year, the market for service and replacements is growing in order to keep existing cars running efficiently. In Europe, most of the countries seem to be well on the way toward the solution of their problems, in the opinion of Mr. Peter, although in Switzerland and Czechoslovakia, he found the resentment against American products very strong.

Dodge Group Working in Field

VanDerZee Heads Party Operating in Eastern Territory

DETROIT, June 1—In an effort to gain additional first-hand information relative to business in general and field conditions in particular sections, and further to intensify Dodge field operations, a group of Dodge Bros. sales, advertising and service executives left Detroit last Wednesday for a series of conferences to be held with regional managers and zone representatives at regional points in New York, Atlanta, Chicago, San Francisco, Dallas, St. Louis and Kansas City during the next two or three weeks. A meeting with the Detroit regional field organization was held the two days prior to their departure.

Two groups will cover the country, one visiting eastern points and the other the west. The eastern party includes A. vanDerZee, general sales manager; K. A. Ridenour, director of sales promotion; D. T. Stanton, director of service, and A. L. Miller, assistant to truck sales manager.

In the western party will be W. M. Purves, passenger car sales manager; W. S. Graves, truck sales manager; F. N. Sim, director of advertising; W. R. Bamford, assistant to director of service, and J. W. Hutchins, director of Plymouth sales for Dodge Bros.

Milwaukee Schedule Cut

MILWAUKEE, June 1—The June schedule for the Milwaukee assembly plant of the Ford Motor Co. calls for the production of 2145 units, compared with 3000 in May and 2600 in April, according to L. T. Henderson, general manager. Despite the reduction, the present payroll, increased 100 since April 1, will be kept intact, but the plant will operate 15 days, or seven less than the standard 22-day Ford schedule.

Hupp Changes Policies

CHICAGO, June 1—Hupp Motor Corp. has had all of its millions of dollars' worth of insurance rewritten in stock insurance companies, Randolph Buck, manager of the Western Factory Association here, announces. The change has been made at a cost of several thousand dollars from the old policy of using mutuals.

McAleer Business Up

DETROIT, June 1—Business of the McAleer Mfg. Co. for the first quarter of 1931, including pre-season orders, showed an increase of approximately 60 per cent over the business of the same period last year, according to C. H. McAleer, president.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

International Garage Exposition, Berlin, Germany .....May 9-Aug. 9

CONVENTIONS

S.A.E. Summer Meeting, White Sulphur Springs .....June 14-19

Steel Founders Society (Mid-Summer), French Lick, Ind....June 17-19

National Association of Credit Men, Boston, Mass. .....June 22-27

American Society Mechanical Engineers, Madison, Wis. (Oil and Gas Power Meeting).....June 23-26

National Association of Taxicab Owners, Chicago, Ill. .....June 29-30

S.A.E. Aeronautic Meeting (in conjunction with Natl. Air Races), Cleveland, Ohio .....Sept. 1-3

Eastern States Exposition, Springfield, Mass. .....Sept. 20-26

American Welding Society, Boston, Mass. .....Sept. 21-25

American Electric Railway Assn., Atlantic City, N. J.....Sept. 26-Oct. 2

National Safety Council, Chicago, Ill. .....Oct. 12-16

Society Industrial Engineers, Pittsburgh, Pa. .....Oct. 14-16

Transportation Meeting, S.A.E., Washington, D. C. .....Nov. 10-12

Truck Legislation Limits Designers

(Continued from page 864)

number of axles. By implication, then, it would appear that a four-wheeled vehicle could carry 24,000 lb. Actually, however, if such a vehicle were loaded to 24,000 lb., it would be impossible to distribute that load so that there would not be more than 12,000 lb. on the rear axle. This is true because of the construction of the vehicle, and also because of the difficulty of handling a vehicle with 12,000 lb. on the steering axle without some sort of power steering. This law, then, in addition to setting an unusually low axle load, practically limits the weight per vehicle still further.

In the field of sizes there was little change other than a more or less general revision of specifications regarding permitted lengths. A number of the states reduced the lengths allowed to combinations from around 85 ft. to figures ranging from 28 ft. to 45 ft. This is regarded in some quarters as a move to eliminate the truckaway units for delivery of passenger cars, and as that is bound to happen in the states where such changes have been made, it may redound to the benefit of the railroads.

Not all the states revised their length limits downward, however. New York, Utah and West Virginia adopted laws setting the limit at 85 ft., this in the case of West Virginia being an upward revision from 60 ft.

De Soto Officials Meeting Dealers

Foy Heads Wide Campaign to Visit Many Sections

DETROIT, June 1—A series of dealer meetings will be conducted in various key cities throughout the United States during the next two weeks by officials of De Soto Motor Corp.

In nature the meetings will follow the convention of more than 60 De Soto dealers held recently at the Naval Armory in Detroit. At that time approximately 60 De Soto de luxe Sixes and Eights were shown the dealers.

The most popular new color combinations were selected by the dealers and are to be retained as standard on De Soto cars. More than 20 of these cars will be exhibited at each meeting during the next few weeks.

Byron C. Foy, De Soto president, will conduct the meetings in New York, Boston and Philadelphia. L. G. Peed, general sales manager, has already left for the West Coast where he will hold meetings in Los Angeles, San Francisco, Portland and Seattle. R. M. Rowland, assistant general sales manager, will supervise the Cleveland, Chicago, Cincinnati and St. Louis meetings, and J. F. Boyd, assistant general sales manager, will have Minneapolis, Kansas City and Dallas.

Buick Plans Dealer Event

FLINT, June 1—Buick dealers all over the United States will hold "open house" during the period up to June 10, according to an announcement made today by the Buick Motor Co. Prospects will be invited into the showrooms to drive a Buick car. National advertising is being used, listing the names of dealers in every territory where it appears.

Buda Company Celebrates

HARVEY, ILL., June 1—The Buda Co. this year celebrates the fiftieth year of its founding, according to an announcement. The company entered the automotive field in 1910. Its plants now occupy about half a million feet of floor space, and the employees number approximately 1500.

USL Replacements Gain

NIAGARA FALLS, N. Y., June 1—Tabulations of replacement battery sales for the first half of May show a gain of 12.4 per cent over the same period in April, according to an announcement today by officials of the USL Battery Corp.

Bradley Tractor Company has increased its stock from 10,000 shares, no par value, to 20,000 shares, no par value.